WITH ILLUSTRATED SUPPLEMENT—TESLA'S ELECTRIC POWER TRANSMISSION WITHOUT WIRES.

# ELECTRICAL REVIEW

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## VIEWS, NEWS AND INTERVIEWS.

Many good Americans have not yet accustomed themselves to the stamp tax which was levied to meet our war expenses. Women, as a rule, do not send many telegrams, and therefore may be excused for forgetting that a one-cent revenue stamp, embellished with a picture of our late battle-ship, the "Maine," must be attached to each telegram sent. A representative of the ELECTRICAL REVIEW, who was in Hartford the other day, witnessed the temporary embarrassment of a young woman who was sending a telegram to New York. She had written the message, which was within the ten-word limit, and handed it with a quarter to a messenger boy who seemed to be in charge of the office. The boy, with a roguish twinkle in his eye, looked up at her and said:

"Twenty-six cents, please."

"Why, there are only ten words," replied the young woman.

"Remember the 'Maine!'" said the boy.

The young woman thought a second — and "remembered the 'Maine'" to the extent of a penny and a blush.

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The electrical men who are in the current political campaign, naturally are supposed to know the wires.

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Steam railroads in the East have had their local business seriously cut into by the development of the trolley lines. In the West local business has not been so important an item as it has been around the large cities of New England, New York, Pennsylvania and New Jersey. The trolley competition has cut seriously into the passenger earnings of many eastern roads. In Indianapolis there is a trolley line 25 miles long, which has cut into the local traffic of Big Four and other large lines centering there, not only in passenger business, but in freight traffic. The passenger trolley cars run at frequent intervals at a smaller fare than the steam roads charge, and run through the day and up to 10 at night freight cars which deliver freight to the people along the line. This has become so important that a question has been raised, as in the East, if it is not for the best interest of the steam roads to control the trolley lines.

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The wife of a dynamo tender went to a haberdasher's to buy a necktie for her husband. She selected a brilliant red one, ready made, whereupon the young and inexperienced salesman, with compassion for the future owner, was moved to remark:

"Excuse me, missus, is this tie for your husband?"

"It is," replied the woman.

"Don't you think he'd rather have some other color? I'm afraid he won't wear this red tie."

"Oh, yes he will," said the woman firmly, "he'll have to—he's dead."

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The Flemish Academy at Antwerp has been discussing the correct equivalent of the French "automobile," and, among other suggestions, has had to deal with that of "Snelpaardelooszonderspoorwegpetroolrijtuig." The expression appears to require a good deal of editing before the citizens of Antwerp can hope to save time by hailing a vehicle of this description.

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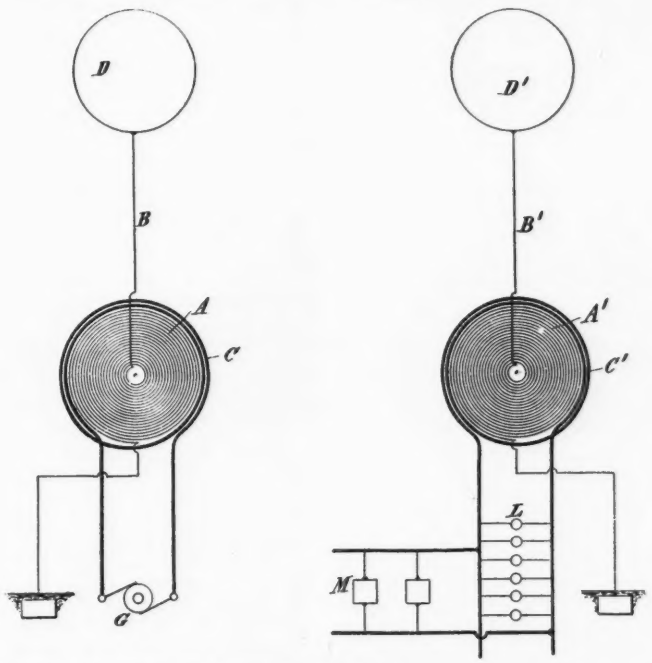
One of those good-natured persons who are always bent on imparting information was humiliated not long since, says the Philadelphia *Saturday Evening Post*. A man, apparently a yokel, was seated on a fence, intently looking at the telegraph wires. A kindly gentleman passing said:




DIAGRAMS ILLUSTRATING TESLA'S SYSTEM OF ELECTRIC POWER TRANSMISSION THROUGH THE AIR.

"Watching the wires, eh?"

"Yes, sir."

"Waiting to see a message go by, eh?"

The man smiled, and said, "Yes, sir."

The gentleman kindly told him that messages were invisible, and explained the work of the electric current to him at length. Concluding, he said: "Now you know something about it?"

"Yes, sir."

"What do you work at?"

"Me and my mate over yonder are old telegraph workers; we're just now putting up some new wires in these parts."

## TESLA'S SYSTEM OF ELECTRIC POWER TRANSMISSION THROUGH NATURAL MEDIA.*

On this novel system patents have been obtained in various countries, and the following is freely quoted from the inventor's own text:

It has been well known heretofore, that if the air enclosed in a vessel be rarefied, its insulating properties are impaired to such an extent that it becomes what may be considered as a true conductor of electricity, although one of admittedly high resistance. The practical information in this matter, however, has been derived from observations manifestly subject to limitations imposed by the character of the apparatus or means heretofore known, and the quality of the electrical effects producible thereby.

It has also been known, particularly since the investigations of Heinrich Hertz, that certain transverse electrical waves or radiations may be transmitted through the atmosphere, and these have been found capable of affecting certain delicate receiving instruments at a limited distance from the source of the electrical disturbance.

The invention which forms the subject of the present application comprises a novel method or system for the transmission of electrical energy without the employment of metallic line conductors, and is primarily designed for use in cases where large amounts of electrical energy are to be transmitted to considerable distances, but the results arrived at are of such character and magnitude, as compared with any heretofore secured, as to render indispensable the employment of means and the utilization of effects essentially different in their characteristics and actions from those before used or investigated.

To be more explicit, the transmission of electrical energy, which forms a part of my present invention, demands for the attainment of practically useful results the production and conversion of excessively high electrical pressures. Heretofore, it has been possible, by means of the

*See photographic reproduction in Supplement to this issue of ELECTRICAL REVIEW.

apparatus at command, to produce only moderate electrical pressures, and even these not without some risks and difficulties, but I have devised means whereby I am enabled to generate with safety and ease electrical pressures measured by hundreds of thousands, and even millions, of volts, and in pursuing investigations with such apparatus, I have discovered certain highly important and useful facts which render practicable the method of transmission of electrical energy hereinafter described.

Among these, and bearing directly upon the invention, are the following: First, that with electrical pressures of the magnitude and character which I have made it possible to produce, the ordinary atmosphere becomes, in a measure, capable of serving as a true conductor for the transmission of the current. Second, that the conductivity of the air increases so materially with the increase of electrical pressure and degree of rarefaction, that it becomes possible to transmit through even moderately rarefied strata of the atmosphere electrical energy up to practically any amount and to any distance.

The system of transmission comprised in my present invention and which, as above stated, was rendered possible only by the production of apparatus of a character radically new and different from any before known, and which is based upon discoveries made in the investigation of the results produced thereby, consists then in producing at a given point a very high electrical pressure, conducting the current caused thereby to earth and to a terminal at an elevation at which the atmosphere serves as a conductor therefor, and collecting the current by a second elevated terminal at a distance from the first.

In order to attain this result it is necessary to employ an apparatus capable of generating electrical pressures vastly in excess of any heretofore used, and to lead the current to earth and to a terminal maintained at an elevation where the rarefied atmosphere is capable of conducting freely the particular current produced; then, at a distant point, where the energy is to be utilized, to maintain a terminal at or about the same elevation to receive the current and to convey it to earth through suitable means for transforming and utilizing it.

The apparatus which I have invented, and by means of which this method of transmission may be effected, is represented in the accompanying drawing, which is a diagrammatic illustration of the system, each transformer comprising a spiral conductor with many turns shown in fine lines surrounded by a conductor indicated in heavy lines with a very few convolutions.

The secondary coil is built up as usual, the wire being wound around an insulating core or spool until its convolutions fill up the space and form one complete layer. The winding is continued in the same way until another layer is formed, and so on. When the desired length of secondary or high-tension coil is thus obtained, the primary or low-tension coil is wound outside of it, but this latter coil is composed of only a very few turns of wire or conductor, which is of much larger diameter of cross-section than the secondary wire.

The transformer thus consists simply of two concentric coils, the inner coil having very many turns of fine wire, the outer coil a very few turns of coarse wire.

From this plan of construction it follows that one of the high-tension terminals is at the center of the secondary coil, and in the use of the coil the other terminal, whether it be connected to ground or not, is electrically connected to the primary, in order that there may be no material difference of potential between the latter and the adjacent convolutions of the secondary.

Assuming that it appears from the above that, in the general plan of construction of the coils, only common and well known methods have been pursued, it remains then to consider the length of the secondary coil. This should be approximately one quarter of the wave length of the electrical disturbance in the circuit, and the reason for it is that the highest possible electrical pressures may be secured at the center terminals of the secondary coils.

A is a coil, generally of many turns and of very large diameter, wound in spiral form either about a magnetic core or not, as may be desired. C is a second coil formed by a conductor of much larger size and smaller length wound around in proximity to the coil A.

In the transmitting apparatus the coil A constitutes the high-tension secondary, and the coil C the primary of much lower tension of a transformer. In the circuit of the primary C is included a suitable source of current G.

One terminal of the secondary A is at the center of the spiral coil, and from this terminal the current is led by a conductor B to a terminal D, preferably of large surface, formed of or maintained by such means as a balloon at an elevation suitable for the purposes of transmission as before described. The other terminal of the secondary A is connected to earth and, preferably, to the primary also, in order that the latter may be of approximately the same potential as the adjacent portions of the secondary, thus insuring safety.

At the receiving station a transformer of similar construction is employed, but in this case the long coil $A^1$ constitutes the primary, and the short coil $C^1$ the secondary of the transformer. In the circuit of the latter are arranged lamps L, motors M, or other devices for utilizing the current. The elevated terminal $D^1$ connects with the center of the coil A , and the other terminal of said coil is connected to earth and preferably also to the coil $C^1$ for the reasons above stated.

The length of the high-tension coil of each apparatus should be approximately one-quarter of the wave length of the electrical disturbance in the circuit, this estimate being based on the velocity of propagation of the electrical disturbance through the coil itself and the circuit with which it is designed to be used. To illustrate, in accordance with accepted views, if the rate at which the current traverses the circuit including the two high-tension coils, be 185,000 miles per second, then a frequency of 925 per second would maintain 925 stationary waves in a circuit 185,000 miles long, and each wave would be 200 miles in length. For such a frequency I should use in each high-tension coil a conductor 50 miles in length, or in general, with due allowance for the capacity of the leading wires and terminals, such length of conductor as would secure the highest electrical pressures at the terminals under the working conditions.

It will be observed that in coils of the character described the potential gradually increases with the number of turns, and the difference of potential between adjacent turns is comparatively small, and a very high potential, impracticable with ordinary coils, may be successfully obtained.

As the main object of the invention is to produce a current of extremely high potential, this object will be facilitated by using a primary current of very considerable frequency, but the frequency of the current is, in large measure, arbitrary, for if the potential be sufficiently high and the terminals of the coils be maintained at a proper elevation where the atmosphere is comparatively rarefied, the intermediate stratum of air will serve as a conductor for the current produced, and the latter will be transmitted through the air with, it may be, even less resistance than through an ordinary copper wire.

The apparatus described, it may be observed, is useful as a means for producing currents of very high potential for other purposes than that of the present system, as, for instance, the coils may be used singly for producing extremely high electrical potentials for any purpose, or used generally in the same manner as other electrical transformers for the conversion and transmission of electrical energy.

It will be understood that either or both of the coils or transformers and terminals may be movable, as, for instance, when carried by vessels floating in the air, or by ships at sea. In the former case the connection of one terminal with the ground might not be permanent, but might be intermittently or inductively established without departing from the spirit of the invention.

As to the elevation of the terminals D, $D^1$, it is obvious that this is a matter which will be determined not only by the condition of the atmosphere, but also by the character of the surrounding country.

Thus, if there be high mountains in the vicinity the terminals should be at a greater height, and generally, they should always be at an altitude much greater than that of the highest objects near them in order to reduce the loss by leakage. Since, by the means described, practically any potential that is desired may be produced, the currents through the air strata may be very small, thus reducing the loss in the air.

It will be observed that the phenomenon here involved in the transmission of electrical energy is one of true conduction, and is not to be confounded with the phenomena of induction or of electrical radiation which have heretofore been observed and experimented with, and which, from their very nature and mode of propagation, would render practically impossible the transmission of any considerable amount of energy to such distances as would be of practical importance.

Of the claims the following may be quoted:

1. The method of transmitting electrical energy herein described, which consists in producing at a given point a very high electrical pressure, conducting the current caused thereby to earth and to a terminal at an elevation at which the atmosphere serves as a conductor therefor, and collecting the current by a second elevated terminal at a distance from the first, as set forth.

2. A system for the transmission of electrical energy, comprising in combination a source of current of very high pressure, connected respectively with the earth and with a terminal at an elevation where the atmosphere forms a conducting path for the current produced, a second elevated terminal at a distance from the first for receiving the current transmitted therefrom and means for utilizing the said current, as set forth.

## Electric Railroads in Reims.

United States Consul Prickitt writes from Reims, under date of September 29, 1898, as follows:

The passenger railroads of this city, which are now being operated by horse-power, are about to be changed to the electric trolley system. This contemplated change has not yet been made public, but I understand that it will be published in about a fortnight. The city railroads are operated by the Compagnie de Tramways de Reims, a Belgian company. The franchise of this company has a long time yet to run, and it has, therefore, an entire monopoly of the street-railroad passenger traffic. The company having determined to change the motive power, and the city having given it permission to do so, it occurred to me that contractors and furnishers of material for electric roads in the United States, if they were informed of this change, might have an opportunity to compete.

All propositions and inquiries should be addressed to La Compagnie de Tramways de Reims, Sharbeck, Brussels, Belgium.

### Electrical Decorations at the Chicago Peace Jubilee.

The handsomest and most substantial arch at the recent Peace Jubilee in Chicago was erected at the corner of La Salle and Washington streets, near the corner of the City Hall.

This arch was a gift to the city, presented jointly by the Western Electric Company, the Chicago Edison Company and the General Electric Company. The design was furnished by John E. Youngberg, and the work done by J. H. Goehst. The arch was 50 feet wide and 35 feet high, the bases being of substantial masonry with an outer covering of wood; the upper part was of frame covered by canvas.

FIGS. 1 AND 2.—FRONT AND REAR VIEWS OF ELECTRICALLY ILLUMINATED ARCH AT THE CHICAGO PEACE JUBILEE.

Twelve hundred 16-candle-power lamps of 113 volts were fed by three No. 0000 cables connected to the City Hall lighting plant. It was wired on the three-wire system, and arranged, in case of emergency, so that it could be thrown onto the Chicago Edison Company's circuits.

On the south side of the arch a large picture of President McKinley adorned the center, with a row of portraits of the naval heroes, Dewey, Sampson, Schley, Philip, Evans, Clark, Wainwright and Hobson. Along the top two marine views—one, the battle of Manila, and the other the battle of Santiago—were on either side and below the portrait of the President.

On the north side General Miles's portrait adorned the center, flanked on either side by the military heroes, Shafter, Brooke, Marshall, Merritt, Cavanaugh, Turner, Lee and Moulton. Beneath the portraits was a picture showing the charge up the hill at San Juan. All the work was done in oil, and the electrical companies in ordering the work done had the best skill obtainable.

Mayor Harrison contributed two poems in prose to be placed on the arch as the sentiments of the people of Chicago, as the arch was Chicago's tribute to its heroes. The first, which was placed on the east end of the arch, is as follows:

Chicago salutes the heroes of the army and swells the hallelujah that hails their return from camp and trench and field.

Heroes whose valor in action and fortitude in hardships have won tribute from every land.

Hurrah for the American soldier, the young and the old, the blue and the gray, who shouted "ready" when the nation called.

On the west end was the greeting to the navy. It reads:

Chicago salutes the heroes of the navy and joins the chorus of jubilation over their triumphs for the flag. Triumphs which have set the world thinking and given the nations a new conception of American power, skill and daring.

The memories that cluster around Manila Bay and Santiago Harbor will live as long as heroism is honored and heroes rewarded—forever.

Around the top of the arch implements of war were in relief. Mr. Thos. G. Grier, of the Western Electric Company, was one of President McKinley's aides during the celebration.

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A fire on October 20 destroyed the power-house of the electric lighting and railway company at Merrill, Wis., valued at $10,000.

### ELECTRIC RAILWAY NOTES.

The Toledo, Ohio, Traction Company, of which Norman B. Ream, of Chicago, is the principal stockholder, has purchased the Toledo Electric Company, the purchase price being $325,000.

The stockholders of the Elgin City, Carpentersville & Aurora, Ill., Railway Company at their annual meeting re-elected the following directors: Wm. Grote, J. B. Lane, A. B. Church, E. D. Waldron, G. P. Lord, G. M. Peck, and D. B. Sherwood.

At the annual meeting of the stockholders of the Nashua, N. H., Street Railway Company the following board of directors was elected for the ensuing year: John A. Fisher, August Fels, Percy Parker, E. M. Tucke, F. C. Anderson, E. A. Smith and Miles F. Brennan; John P. Goggin, clerk, and Percy Parker, treasurer.

The Saginaw & Frankenmuth, Mich., Electric Railway Company is securing the right of way for the road, which will be constructed early in the ensuing year, and a project is being quietly consummated for the construction of an electric railroad from Saginaw to Owosso, traversing the newly developed coal fields in that section of this county.

The Exeter Street Railway Company, of Boston, has declared a semi-annual dividend of three per cent, payable October 31, to stockholders of record October 25. The road has been in operation 15 months and shows net earnings $9,148 for that period. The line will be extended shortly, making connections with Newburyport and Amesbury on the south and Portsmouth on the north.

Official announcement was made last week that the directors of the Fair Haven & Westville and the New Haven, Ct., Street Railway companies had agreed upon consolidation of their lines under the management of the former corporation. This brings practically the entire street railway service of New Haven under one management. The deal will be pushed through at once. The two roads have a combined length of about 50 miles.

At the annual meeting of the stockholders of the Worcester, Mass., & Clinton Street Railway the following named directors were chosen: A. S. Paton, George R. Damon, W. S. Reed, George P. Damon, all of Leominster; James Marbie and Col. T. S. Johnson, of Worcester; George A. Flagg, of Boylston, and Walter R. Dame, of Clinton. The board organized by the choice of the following officers: President, A. S. Paton; vice-president, W. S. Reed; clerk and treasurer, Walter R. Dame; executive committee, Messrs. Paton, Reed, and Dame.

A company has been formed for the purpose of building a narrow-gage electric railroad from San Luis Potosi, Mex., to the mining district of Rio Verde, 66 miles distant. The name of the company is the Potosi & Rio Verde Railway Company. It has a capital stock of $200,000. The directors are George F. Peabody, Edward M. Shepard, A. Foster Higgins, Chas. J. Nourse, Jr., Herbert H. Dean, Samuel H. Ordway and Francis N. Holbrook, all of New York city, and Donald C. Brown and Robert S. Towne, of San Luis Potosi. A concession for the proposed road has been obtained from the Mexican Government, and the work of construction will commence in a short time. The road will be used to handle ore from the Rio Verde mining camp to the smelter in San Luis Potosi.

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### KIND WORDS.

LIKE THOUSANDS OF OTHERS.

TO THE EDITOR OF ELECTRICAL REVIEW:

Enclosed is a draft on the Chemical National Bank for $3, in payment for my subscription for the coming year. I can't do without the REVIEW. Please send me your book catalogue. Yours truly,

HENRY GEBHART.

Dayton, Ohio, October 13.

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The Pennsylvania Telephone Company at Harrisburg, Pa., are building a handsome new exchange building, and are putting some of the main lines under ground.

## FOREIGN ELECTRICAL NEWS.

*The Extension of Trolley Lines in France* — Next to Germany, says *L'Electricien*, France possesses more electric tramways than any other country in Europe. During 1897 alone, the number of kilometres added to its system amounted to the respectable sum of 117,800; in other words, in the space of 12 months, almost as many miles of electric tramways were constructed in France as now exist in England. Of the systems in use, 172 companies have adopted overhead trolley wires, eight have preferred underground conductors, and 13 have declared in favor of accumulators.

*Electric Cabs in Paris*—The first electric cab was run in Paris on September 10 last, the fare charged being the same as that paid for the use of the horse vehicle; namely, one franc 50 centimes a trip, or two francs if hired by the hour. This cab was numbered 16,000 by the police prefecture (16,001 would have seemed more rational), and is manufactured by the C. G. T. A.—Compagnie Générale des Transports Automobiles. This company proposes to place some 100 or more of these cabs in the streets for hire, and several other companies are now being formed for the same purpose. During the forthcoming exhibition in Paris there will, in all probability, be about 1,000 electric cabs in service in this city.

*Speed of Tramways*—An engineer of Cologne, M. Giron, has made an inquiry into the speed judged most suitable by the different tramway companies. He has received a number of answers from Belgium, France, Germany, Italy, Austria, etc., from which he draws the following conclusions: In a general way, and as may be foreseen, the speed of suburban lines is greater in all cases than that of urban lines. The maximum speed, for the first, varies from nine to 12 miles, and is reduced, in the second, to eight miles an hour. Various companies, however, estimate that in ordinary streets the speed could be increased to 16, and even to 18 miles, when the way is clear, with this corrective that special regulation should be made for stops, crossings, curves, etc.—*L'Illustration.*

*An Electric Diverter*—An apparatus has been invented to protect the electrician from shocks from electric batteries when the current may be inadvertently turned on during a repair, the apparatus diverting the current before it can reach his body. The instrument is placed in such a position as to operate in front of the workman. For air lines it is composed of six hooks attached to each other, in groups of three, and mounted on a common insulated handle or bar which allows of their being fastened to the line without the use of a ladder. Each group of hooks is placed in communication with the earth by means of a flexible conductor attached to a metallic peg fastened in the ground. For subterranean lines, the group of hooks is replaced by nippers, the insulated handles of which, firmly kept apart by a spring, are also placed in communication with the earth by means of wires and metallic pegs.—*Revue Scientifique.*

*Preparation and Properties of Hydride of Calcium*—It is possible to obtain, by the direct union of calcium and hydrogen, a transparent crystallized hydride of formula $Ca.H_2$. This hydride is stable at a high temperature, and is a powerful reductor. On account of the violent decomposition which is produced on contact with cold water, it is similar to crystallized carbide of calcium, prepared in electric furnaces. In this combination the hydride is comparable to metalloids (carbon and phosphorus) and not to metals. The appearance, too, of the hydride removes it entirely from the hydride of Troost and Hauteville, and the hydride platinum of Graham. In fact, there are two kinds of hydrides—those in which the hydride seems to be in solution in the metals, and others which are formed at higher or lower temperatures, and which have every appearance of chemical and determined combination. — *L'Industrie Electrique.*

*Electric and Cable Traction*—There are few cable tramways in England, says *L'Electricien*, and the reason for this is partly to be ascribed to the declivity of the routes. Moreover, it has not yet been proven that electric traction, even on these same roads, could not be substituted for cable traction and substituted advantageously. The municipal authorities of Newcastle-on-Tyne have recently had an inquiry made into the question of knowing which would be the more preferable mode of propulsion for their tramway lines. Opinions were divided; two experts were in favor of cable traction and the other was disposed for electricity. Whether it was a judicious move on the part of the authorities is questionable, since each expert would naturally be inclined to plead the cause of his favorite system, and to point out the special advantages attached to the adoption of it. Dr. John Hopkinson was in favor of electric traction, and Mr. Colam of cable traction. Each expert concluded that his system was the more advantageous for the entire line, which is some 20 miles in length. The initial expense necessary for cable traction is much larger than that for electric, but it is estimated that the costs of exploitation are five pence per electric carriage mile and three pence per cable mile, a difference that would probably weigh with the municipal council. The total cost of construction for the 40 miles of way, for electric traction, is £358,877, and for cable traction, £452,080. It is interesting to notice that there is a great difference between the estimated cost of upkeep as worked out by the two experts. Dr. Hopkinson requires more than 10 per cent of the capital for the electric system, which carries the total to £37,745; while with a large capital, the cost under the cable system is only £10,602.

*Electric Tramways Along the Coasts of England*—A good deal of interest (writes the English correspondent of *L'Electricien*) now centers around the question relative to the establishment of lines of tramways between the towns situated on the coasts of England. It was at first proposed to have easy and rapid transit between several of the more important resorts along the coast by means of electric tramways. These lines, it is evident, would never work in a practical manner except during certain months of the year, the Summer season especially, for during the Winter months these lines would hardly pay for the trouble and expense incurred in running them. In several instances, however, the traffic of the Summer season alone would compensate for the dead season, even if there was a diminution in the receipts. It seems certain, in any event, that there is a good business to be made out of the installation of tramways along the English coast, although it must be acknowledged that there are numerous difficulties to be overcome, especially as the overhead trolley will be looked upon as anti-esthetic by the lovers of our rock-bound shores. An excellent scheme of installation, which has just been approved by the Board of Trade, is that of connecting Margate, Saint Peter's, Broadstairs and Ramsgate together. Mr. W. M. Murphy was chosen director of the installation in 1896, but since then the local authorities have formally opposed the matter, and up to the present nothing has yet been done. It seems possible, however, that arrangements will be made and the scheme realized.

## The Telephone Manufacturing Company's Apparatus.

In the accompanying illustrations are shown several types of telephone apparatus and switchboards manufactured by the Telephone Manufacturing Company, of Sumter, S. C. The Telephone Manufacturing Company were organized and began business in June of last year, having succeeded the Mason Electrical Works, established in Sumter about four years ago. When the start was made in June, 1897, the company's maximum capacity was about 25 telephones per week. Since then they have made five extensions to their plant and they now have a thoroughly equipped telephone factory. The present capacity is about 300 telephones per week and 200 switchboard drops. They manufacture in their own plant everything that enters into the construction of their apparatus. They have their own nickel-plating, enameling and wood-working departments.

The company have recently equipped their factory with a generator department. The generator will be put on the market in about 60 days. This machine is so designed as to eliminate many of the objectionable features that have developed in other makes of generators. While it gives a high electrical efficiency its construction and mechanical detail have been very carefully considered.

The Telephone Manufacturing Company's entire line of apparatus is distinctly unique, and, since they manufacture all their own parts, each part has a distinctive appearance which belongs alone to the "Imperial" telephone. The instrument is so wired that none of its circuits cross in any part of the 'phone. The gravity hook switch, which was designed and brought out by the old company, has proven by actual tests to be a most reliable and positive switch. It is self-contained and its spring contacts, being of German silver spring stock, trending always under tension, make it impossible for their adjustment to get out of order. The instrument is also wired so that any of its parts may be removed or the entire instrument disassembled and reassembled without taking it from the wall. All the circuits are concealed, there being no unnecessary outside work or binding posts. In the No. 6 long-distance type of telephone, the primary circuit is entirely independent of the iron transmitter arm and base. A separate silk covered, double conductor cord is used for this circuit, terminating in binding posts which pass through the backboard just beside the iron arm

base. These binding posts, and in fact all the binding posts used in the instrument, are made of solid stock and the wires connected thereto are soldered. The induction coils are carefully hand wound, and arranged with a special and very convenient terminal used only by this company.

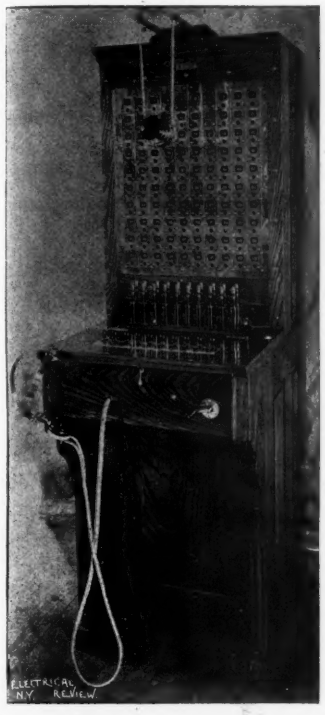

FIG. 1.—100-DROP SECTION OF THE TELEPHONE MANUFACTURING COMPANY'S SWITCHBOARD.

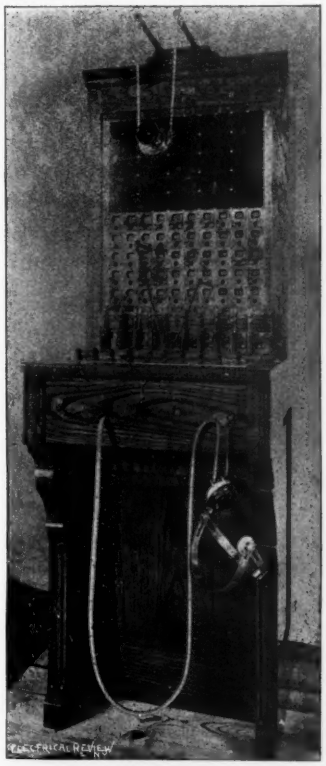

FIG. 2.—100-DROP SECTION OF THE TELEPHONE MANUFACTURING COMPANY'S SWITCHBOARD WITH 50 DROPS INSTALLED.

The general appearance of the instrument is very neat and the woodwork of a very superior finish, all sets being carefully rubbed down with oil after varnishing. Each telephone is equipped with a mica carbon disk lightning arrester, which is used instead of the ordinary type of sawtooth arrester, as mounted on the top of the magneto. The ringer is so constructed that the coil and any other part of it may be adjusted or removed and reassembled without taking the base of the ringer from the magneto-box door. The "Imperial" transmitter is, to quote from a customer who has about 600 of them in service, "well made and a beautiful talker, strong in volume, perfect and clear, tones coming perfectly natural and distinct." The transmitter, like all other parts of the instrument, can be readily disassembled and reassembled if necessary. There are now about 10,000 of these in successful use.

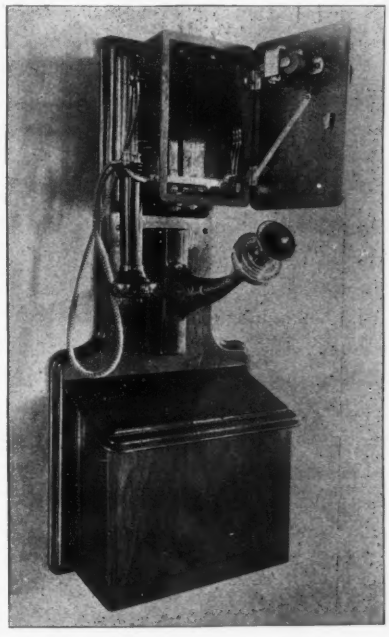

FIG. 3.—THE TELEPHONE MANUFACTURING COMPANY'S NO. 6 "IMPERIAL" TELEPHONE.

This company's switchboard is a very satisfactory and perfect working instrument. They have very recently brought this board out, and now have about a dozen in service, which have proved most satisfactory in every respect. The drop and jack is self-contained, and the shutter is automatically restored by the application of the plug into the jack. The drop-shutter disappears, or rather falls in, towards the drop coil, an unique feature. The self-restoring feature is positive, and it is said to be impossible for it to get out of order or adjustment, or give any trouble of any kind. The various circuits in the board are separate from each other. The drop is so constructed as to eliminate any possible chance of inductive disturbances. The subscribers' station is rung by simply pushing the plug into the jack. Each drop and jack may be removed from the board without disturbing any other part of the board. The clearing-out drops are so constructed as to prevent any cross-talk between these drop coils, and the shutters are automatically restored by the plug when it returns to its socket in the operator's table. For large boards a very efficient and rapid transfer system is used, the "instruction" circuit between operators being established as the plug enters the transfer jack. The company is now constructing one of these boards of 400 drops capacity for the Citizens' Telephone Company, of Spartanburg, S. C. This system is to be full metallic of the most modern installation. The "Imperial" telephones are now being used on many of the largest exchanges throughout the country.

## ELECTRIC LIGHT FLASHES.

The Edison Electric Light Company's plant at York, Pa., was seriously damaged by an accident in their boiler-room last Friday, and portions of the city are in darkness. Foot pads are taking advantage of the situation.

The earnings for September of the Edison Electric Illuminating Company of New York were as follows:

| | 1898. | 1897. | Increase. |
|---|---|---|---|
| Gross..... | $ 230,123 78 | $ 182,187 07 | $ 47,936 71 |
| Net..... | 88,925 62 | 68,883 62 | 20,042 00 |
| Gross, 9 mos. | $2,170,763 50 | $1,743,754 52 | $427,008 98 |
| Net, 9 mos... | 908,377 75 | 765,855 23 | 142,522 52 |

By order of Judge Mount the plant of the Citizens' Light and Power Company, of Kokomo, Ind., will be sold at receiver's sale November 12. The plant originally cost $70,000 and is the only electric light company there.

At the annual meeting of the Burlington, Vt., Electric Light and Power Company the following officers were chosen: President, R. Frank Wood; vice-president, Griffith W. Lewis; treasurer, Thomas Daniels; secretary, Howard Flanders; directors, George A. Allinson, Howard E. Packer, James O. Glasgow, Nathan Haines and J. Frank Budd.

The new plant of the Woburn, Mass., Electric, Heat & Power Company is expected to be in operation by December 1. It will be equipped with all the modern electrical appliances.

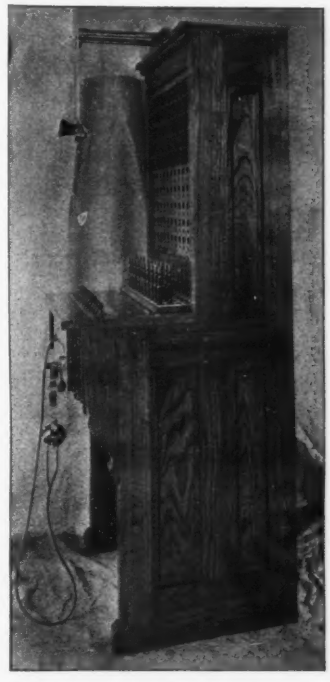

FIG. 4.—SIDE VIEW OF A SWITCHBOARD MADE BY THE TELEPHONE MANUFACTURING COMPANY.

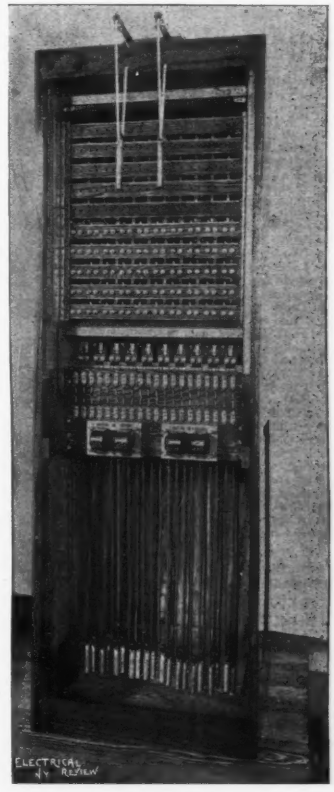

FIG. 5.—REAR VIEW OF THE TELEPHONE MANUFACTURING COMPANY'S SWITCHBOARD WITH 50 DROPS INSTALLED.

# Electrical Review

OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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While we are naturally pleased at the reiterated evidence that the ELECTRICAL REVIEW is the most widely quoted electrical publication in the world, we respectfully suggest to our daily contemporaries that care in assigning proper credit for borrowed matter will be appreciated, not only by ourselves, but by our electrical contemporaries.

## *A WONDERFUL POSSIBILITY IN ELECTRIC POWER TRANSMISSION.*

As civilization advances and our needs multiply, the demands on the toilers in the various departments of science constantly increase, and naturally the activity in the direction of providing new resources becomes more and more intense. But the severest burden is undoubtedly on the engineer, mechanic or inventor, whose task it is to produce motive power. The problem of providing economical power has ever taxed the inventive mind, and with the introduction of electricity a great stride in advance has been effected. But still, many limitations were encountered in the difficulties of efficiently transmitting the energy of great sources of power, which exist in abundance in Nature, to remote places of utilization.

Here it is that Nikola Tesla did his first great work by discovering the rotating magnetic field, and applying it to a practical system of electric power transmission, now used in all parts of the world.

As we were then, so now we are privileged to record another forward step, which, if successful on a large scale, will prove of astounding consequences, for it will open up unlimited resources of practically costless power. Tesla now proposes to transmit, without the use of any wires, through the natural media—the earth and the air—great amounts of power to distances of thousands of miles. This will appear a dream—a tale from the Arabian Nights. But the extraordinary discoveries Tesla has made during a number of years of incessant labor, which are authoritatively described and illustrated in our present issue, make it evident that his work in this field has passed the stage of mere laboratory experiment, and is ready for a practical test on an industrial scale. The success of his efforts means that power from such sources as Niagara will become available in any part of the world regardless of distance.

The photographic reproduction contained in our present issue, which is explained in its title, illustrates one of the remarkable effects produced by Tesla's improved apparatus.

## *SOME VIEWS ON ELECTRICAL MATTERS IN NEW YORK CITY.*

During the past two weeks the daily press of New York city has been exercised about the future plans of the Metropolitan Street Railway Company and the Third Avenue Railroad Company. A contributing cause to this excitement was the incorporation about three weeks ago of the New York Gas, Electric Light, Heat and Power Company, with a capital stock of $25,000,000. Several attempts have been made to trace a mutual connection between the three companies named.

The prime reasons for assuming that there is any connection between these companies seem to be that the Metropolitan Street Railway Company is installing underground work for running its Broadway cable line by electricity; that the Third Avenue Railroad Company is about to do the same thing, and that both are installing more underground conduits than will be, at present, required for strictly street railway purposes. The newly incorporated electric light and power company seems to be involved from the fact that its capital is unusually large for a company of that sort, and that as far as any one can learn it has no tangible assets to warrant so high a capitalization. Endeavors have been made to prove that the light and power company is connected directly or indirectly with one or both of the street railway companies named to purchase any excess power they may generate with their new equipment, for distribution for light and power purposes through the conduits not at present required for the operation of the street railroads.

The ELECTRICAL REVIEW has been at some pains to secure the facts in the case, and from the mass of information acquired assumes the following to be true:

A hole in the ground is a mighty good thing to own in a large city like New York, which is bound to be politically disrupted from time to time. Therefore, it is but fair to assume that the engineers employed by the Metropolitan Street Railway Company and the Third Avenue Railroad Company would naturally provide for future extensions of both roads in the way of underground conduits when the best opportunity offers; that is, when the original underground installation is made. It is understood that the charters of both these street railway companies permit them to carry on a passenger street railway business only.

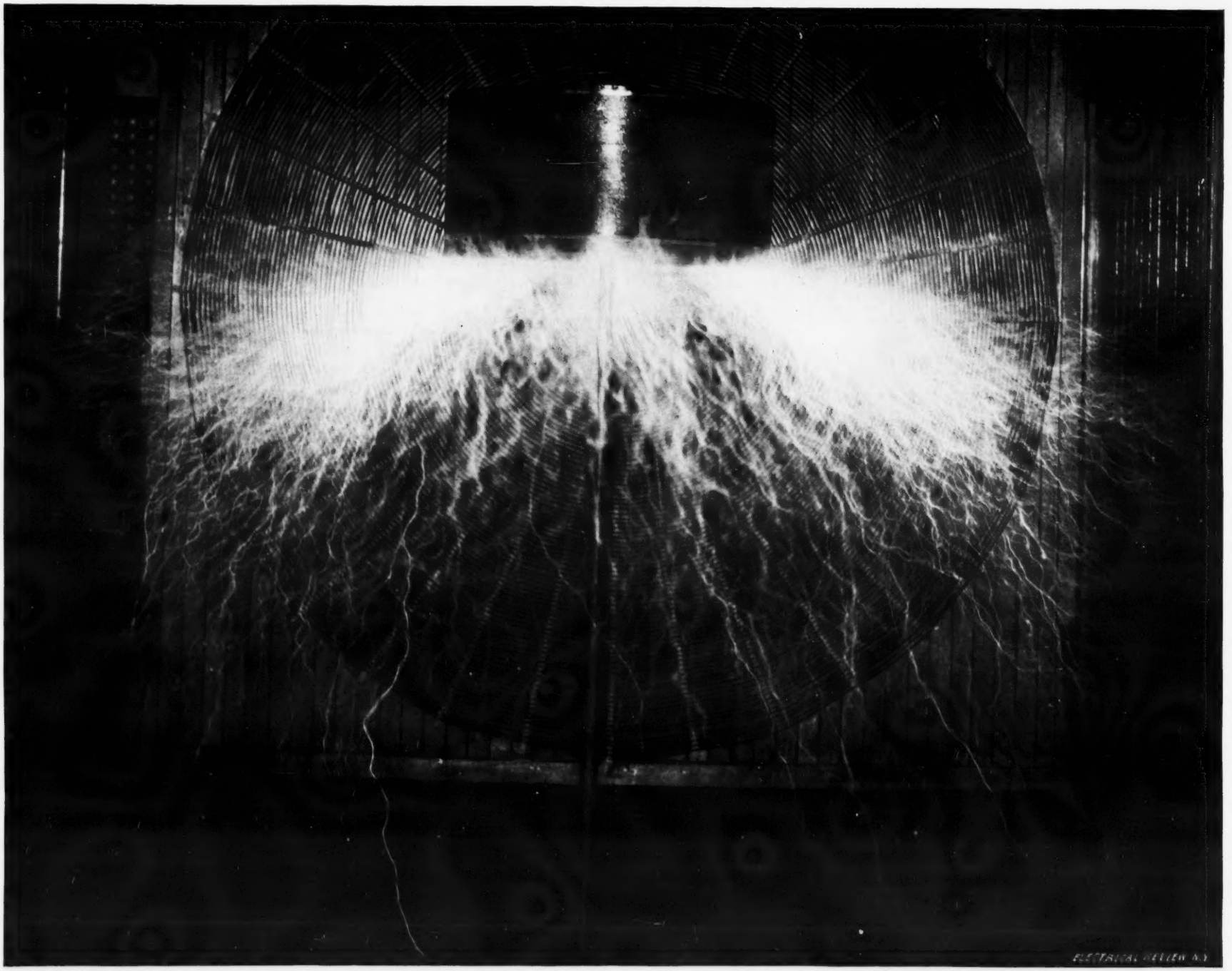
The New York Gas, Electric Light, Heat and Power Company is understood to have acquired one or more existing electric light and power franchises in New York city, which, while they have a tangible value at the present time, promise to be very much more valuable in the future. It is becoming more and more difficult each year to secure franchises for public corporations in the large cities of New York state, and it is already an impossibility to secure franchises as liberal in their terms as those which have been secured in the past and now exist.

We submit these views to our readers as a reasonable and logical explanation of a simple matter, which the newspapers are apparently trying to complicate.

## *THE ELECTRIC PALACE AT THE PARIS EXHIBITION.*

The working of the powerful machinery which will be exhibited in 1900 will require an hydraulic force that has been estimated at 12,000 horse-power, or a volume of water of about 1,200 litres per second. This water will be taken from the Seine, but whether it will be circulated invisibly in underground conduits or utilized, before it reaches the machinery, for the purpose of forming sparkling waterfalls, so pleasing to the eye, is yet undecided. At present the matter is being discussed, the gentleman in special charge of the conduit-house, says *L'Electricien*, being in favor of a palace in which light and water will join hands in their fairy effects. The waterfall will be 34 metres in height, and the whole, if carried out, will form one of the most pleasing sights for the visitors to the Champ de Mars.

There would seem to be an opportunity here for some of our own electric fountain experts, who stand at the head in this branch the world over.



"Tesla's System of Electric Power Transmission Through Natural Media."—View of Model Transformer, or "Oscillator," Photographed in Action.—Actual Width of Space Traversed by the Luminous Streams Issuing from a Circular Single Terminal over Sixteen Feet.—Area Covered by the Streamers Approximately Two Hundred Square Feet.—Estimated Effective Electrical Pressure Two and One-half Million Volts.

### Chicago Edison Company Entertains Its War Heroes.

When the first call for volunteers in the late Spanish war was made a number of the employés of the Chicago Edison Company tendered their services to the government in both the army and the navy. The Chicago Edison Company held their places for them during their absence at the front, and Mr. Samuel Insull, the president of the company, a few days ago tendered a banquet at the Grand Pacific Hotel, Chicago, to the returned heroes. Those who went from the Edison company to the war were the following:

Ensign B. R. T. Collins, "Scorpion;" S. H. McEwen, gunner's mate, "Oregon;" Thomas Roberts, gunner's mate, "Oregon;" A. Montgomery, gunner's mate, "Oregon;" W. B. Tullock, water tender, "Suwanee;" John Miller, machinist, "Newark;" Joseph Goldsmith, machinist, "Oregon;" T. A. Cressey, bugler, "Cincinnati;" Lieut. A. C. Parsons, U. S. N., Washington; H. Kenney, private, Seventh Regiment; A. J. Morgan, bugler, First Regiment; E. C. Colby, quartermaster's sergeant, Second Regiment; J. Fitzsimmons, private, First Regiment; J. B. Kempter, private, Second Regiment; William Cleff, first sergeant, First Regiment; S. A. Rutherford, sergeant, engineer corps, First Regiment.

A number of these are still in the service and others are in the hospitals. At the dinner given by Mr. Insull, the following were present: Messrs. Collins, McEwen, Roberts, Tullock, Montgomery, Miller, Goldsmith, Kenney and Fitzsimmons. A number of guests were also invited and the members of the Chicago Edison Club turned out in full force. Some interesting experiences of the war were related and a number of war relics were exhibited.

### A National Electrical Credit Association.

A meeting was recently held in Cincinnati of delegates from the local electrical trades societies of New York, Philadelphia, Chicago and Cincinnati. The object of the meeting was to form a national credit association, the membership of which is to be composed of local electrical trades societies now organized and others to be organized. The officers of the National Electrical Credit Association are as follows: Mr. R. E. Gallaher, of New York, president; Mr. C. M. Wilkins, of Philadelphia, vice-president; Mr. F. P. Vose, of Chicago, secretary and treasurer. The board of management is composed of one member from each local society. The National Association will issue monthly bulletins of delinquents in the electrical trade and other information of interest and value to its members.

It is understood that an electrical trades society is now being organized in San Francisco and another is in process of formation in Montreal.

### American Institute of Electrical Engineers.

The 128th meeting of the Institute will be held at 12 West Thirty-first street, New York city, on Wednesday, October 26, 1898, at 8 o'clock P. M. A paper will be presented by A. A. Knudson, of New York city, on "An Electrical Survey in the Borough of Manhattan, New York City," showing results of stray current measurements between electric railways, underground pipes, etc., also results of tests on the Brooklyn Bridge.

### Use of Electricity in Washington Department Buildings.

In his annual report, Chief Engineer Baird, superintendent of the State, War and Navy Department buildings at Washington, states that the mean load on the dynamos was 54 per cent of the output of one plant, while for the same period of 1897 the load was 23 4 per cent. Notwithstanding the great increase in the consumption of electric current, less coal was used. This, the superintendent says, was largely due to the substitution of electric motors for steam engines in the two printing presses. There is no means of ascertaining the consumption of steam by the different engines in the building, but the engine which runs the dynamos is of very superior quality, while those which ran the printing presses were not only of inferior design and make but had very long steam pipes. They were formerly run eight hours a day, whether a press ran or not. Now each press has its individual motor, which stops when the press stops.

Before electricity was introduced into the buildings the average number of gas lights was 144; now the average number of 16-candle-power electric lamps is 428. The great increase in the quantity of light used by the clerks is an indication of their better facilities for work. The Executive Mansion is lighted from the dynamos in the State, War and Navy buildings. The lamps in the two buildings aggregate 3,400, and the motors aggregate 27.75 horse-power.

All the telegraph and telephone wires have been removed from the roof of the great building and placed under ground.

### Enclosed Arc-Lamp Decision.

In the suit of the Marks Enclosed Arc Light Company, of New York, against the Washington Mills Company, a decision has been rendered in favor of the complainant. The suit was begun in the United States Circuit Court, September 10, 1897, and the decree granted to the Marks company by Judge Coxe on October 18, 1898. The patent infringed is No. 520,996 of Marks & Ransom, dated June 5, 1894. This patent broadly is claimed to cover the method of operation used in all modern enclosed arc lamps. The Washington Mills Company were users of the Kinsman lamp sold by the Electric Construction and Supply Company, of New York. The decision peremptorily stops the sale of unlicensed enclosed arc lamps by the Kinsman Company, and also involves the payment of damages by the defendant.

It is understood that suit under the above patent has been commenced against B. Altman & Company, of New York city, who are using General Electric enclosed arc lamps.

The following named companies are working under licenses from the Marks Enclosed Arc Light Company: The Electric Arc Light Company, makers of the Pioneer lamp; the Manhattan General Construction Company, makers of the Manhattan lamp, and the General Incandescent Arc Light Company, makers of the Bergmann lamp.

### Wall Street and the Electrical Stock Market.

The general market during the past week was dull and the dealings were light and uncertain in tone. The political campaign is absorbing general attention and is assigned as the principal reason for the stock market lethargy. In spite of the fact that speculation is temporarily sluggish, it is asserted that actual investment is going on in undiminished volume.

On the New York exchange General Electric closed at 78 bid and 79 asked, a decline of one-half point. Edison Illuminating of New York closed at 127 bid and 130 asked, an advance of seven points for the week. Western Union closed at 91⅜ bid and 91½ asked. On the Boston exchange American Bell Telephone closed at 277 bid and 278 asked. Erie Telephone closed at 74¼ bid and 75 asked. On the Philadelphia exchange Electric Storage Battery (common) closed at 38¾ bid and 39 asked.

Wall Street, October 22.

### PERSONAL.

Sir William Crookes and M. Henri Moissan have been elected honorary members of the American Chemical Society.

Prof. Wm. A. Anthony has received an appointment as lecturer in electrical engineering at Columbia University, New York city.

Mr. James Stillman has been elected a director of the Western Union Telegraph Company, taking the place of Mr. R. G. Rolston, deceased.

Mr. F. C. Phillips, of the Elwell-Parker Electric Company, Cleveland, Ohio, was a New York visitor last week. While here Mr. Parker arranged for a large shipment of electric motors to Austria.

Dr. Cary T. Hutchinson has assumed charge of the electrical engineering department at Johns Hopkins University, Baltimore, *vice* Dr. Louis Duncan, who has been granted one year's sick leave by the faculty.

Mr. Morris W. Mead, chief of the Bureau of Electricity of Pittsburgh, was in New York city last week. The recent successful electrical illuminations in Pittsburgh in honor of the Knights Templar were installed under Mr. Mead's supervision.

Manager Anton R. von Kerpely, of the Alpine Iron and Steel Works, Vienna, one of the largest houses in this line in the world, employing over 15,000 men, was a New York visitor last week, under the guidance of Mr. W. A. Stadelman. The eminent Austrian left New York for home on Saturday, after placing a number of large orders for electrical and other machinery.

Mr. M. Cokeley, who is probably known to many of our readers, has been made superintendent of the works of the C. W. Hunt Company, Staten Island, N. Y., assuming the duties of that position October 14, after several months' work revising the factory systems. Mr. Cokeley has made this special work his profession for some time, being for many years with the General Electric Company.

### The Municipal Club, of Brooklyn, N. Y.

About 30 members of the Municipal Club, of Brooklyn, N. Y., headed by Col. John N. Partridge, ex-police commissioner, visited police headquarters on October 18 and inspected the telegraph and telephone systems there in use. The visitors were entertained by Mr. F. C. Mason, superintendent of police telegraph.

### The London Central Railway.

A visit to the depot, at Shepherd's-Bush, London, of this great and interesting undertaking already makes apparent the real magnitude of the electric plant and the provisions for the train service in connection therewith. The site—formerly Woodhouse Park, an extensive private residence and grounds — is over 1,000 feet in one direction by 800 in the other; and the work of erecting the generating-house, the boiler-house, the carriage sheds, repairing shops and other buildings is being carried on day and night, with the aid of many brilliant arc lights. Further, a useful application of electrical energy is being largely employed in lifts for raising the building materials from the ground to the upper portions of the walls and premises in course of construction. Very considerable economy is realized by this means, while convenience is largely facilitated, for instead of employing a number of small steam engines, each needing attendance, labor and attention, a temporary electric plant is put down, and power is conveyed from it to small motors where required. In this way hoists and mortar-mills are worked, barrows elevated and other operations performed in the smartest and handiest manner.

The generating-house is the most advanced. It is 200 feet in length, 86 feet wide and 66 feet in height from the engine-room floor to the apex of the roof. The walls are built up to their intended height, and their interior surface, constituted of glazed bricks, the upper portion in cream color and the lower bands of green and dark brown, present a cleanly and very handsome effect. Across the far end of the edifice, offices to the height of several stories will be raised for the transaction of the company's business, and on the inner front will be a suitable switchboard. From this position the switchmen can see over the entire interior and watch the six great Allis horizontal compound condensing engines, with their ponderous flywheels, weighing 100,000 pounds apiece and making 94 revolutions per minute. Each engine develops 1,300 horse-power, and is capable, in emergency, of giving 2,000 horse-power. The shafts of the engines are coupled to their respective dynamos, which are of the alternating type, and each has a capacity of 850 kilowatts. A three-phase current is the result produced at a tension of 5,000 volts. The current at this tension is sent in lead-covered cables to four sub-stations in the main traffic tunnels, against the walls of which the cables are carefully suspended, and rendered absolutely safe by a removable protective covering. These four sub-stations are at Nottinghillgate, Marble Arch, Davies street and the post office, the lift-shafts having been deepened 20 feet to accommodate the electric machinery. The high-tension electric current, which has been employed for facility of transmission, has to be lowered at the sub-station to the more moderate pressure of 500 volts, and there also it is transformed by rotary converters from alternating into direct current. Two of these sub-stations have a capacity of 1,800 and two 900 kilowatts, the latter being the unit adopted. This 500-volt current feeds the midrail of the railway traffic lines in the tunnels.

The locomotives which draw the trains pick up their working current by means of two metal slippers which slide on the rail. The current is then taken to an electric controller on the locomotive, whence it passes to four motors which are regulated by it. Having done its work the current is returned through the wheels to the two outer rails of the ordinary track line to the sub-stations. The cab or cabin of the locomotive is central, the framework projecting fore and aft of it, and by means of galleries along the projecting ends the driver, or his mate, can see to the external working parts without getting down from his locomotive. All the apparatus described, as well as the gearing and air-compressor of the Westinghouse brake, are contained in the cab. Everything is thus protected and under the immediate eye and hand of the responsible driver. The locomotive itself is 30 feet long and 40 tons in weight. It is mounted on bogie trucks, and has the armatures of the electric motors for hauling the trains mounted direct on the axles. It is of 500 horse-power nominal, and is the largest and most powerful of its class, with but one special exception in the United States; namely, those locomotives which run in the tunnel under Baltimore.

On the Central London line the ordinary speed of running will be 14 miles an hour, making the journey through the 13 stations on the line, including stoppages, in 25 minutes. But a maximum speed of from 30 to 40 miles can be obtained. The trains are composed of seven carriages on bogie trucks—two first class and five seconds—all of capacious dimensions (45 feet long by eight feet six inches broad), the full train-load being 336 seated passengers. The carriages are handsomely upholstered, and will be entered at both ends. There is a central gangway, all the seats having their backs against the sides of the carriages except the four middle ones. Along the length of the railway there are 48 electric lifts, capable of raising from 60 to 100 passengers each, at the respective stations, three being the least number at any one, and five the maximum at the bank and the post office. The safety of the electric elevators has been amply tested and proven.

Returning to the depot, an enormous shed 360 feet in length and covering an area of two and three-quarter acres, is rapidly being prepared for housing the carriages and the trains. Adjoining is a large open space for washing and cleaning the rolling stock. There are also three miles of sidings laid out on the surrounding ground. For the locomotives there are very fine examination and repairing sheds. The boiler-house for supplying steam to the generating-house has a capacity of 16 Babcock & Wilcox tubular boilers, and is fully equal in architectural dimensions and features to its surroundings. The two colossal chimney stacks will attain to the lofty elevation of 200 feet. The arrangements for receiving the fuel and transmitting it to the furnaces show commendable foresight. The coal will be tipped into a general hopper; thence it will be carried by a "conveyer" to bunkers above the boilers, which are operated by mechanical stokers. The furnaces will be fed by tubes from the bunkers as needful. The ashes are raked below into the coal trucks and will be carried out of the depot. The exhaust steam from the engines will be handled by jet condensers and by Hunt's cooling towers. Underneath the latter are large tanks for storing the circulating water.

The progress made is already considerable, and it is hoped the line will be completed in June, 1899. In the generating-house the massive foundations for the powerful engines are erected to their full height, and the level of the floor can be clearly followed, with the ample spaces beneath it, where will be placed pipes and cables, out of the way of injury and, at the same time, convenient of access. Outside the building are numbers of heavy cases and other signs of materials at hand for use, and everywhere are indications of rapid progress.

In the buildings and trains there will be a profusion of electric lighting, it being part of the policy of the company to have everything connected with their passenger service as bright and as agreeable as practicable. They also intend to duplicate the plant, or otherwise to have always at hand some available relief in emergencies. The method of running the trains, too, is notable. The railway track descends in both directions from every station. Speed, therefore, is got up at once soon after the start. The contract for the execution of the whole work has been taken by the Electric Traction Company, of which Sir Richard Farrant is chairman, and, on completion, the entire undertaking will be handed over, in running condition, to the Central London Railway Company. The electric equipment for the railway is being supplied by the British Thomson-Houston company; the train coaches by the Ashbury Railway Carriage and Iron Company and by the Brush Engineering Company, of Loughborough; and they will be amongst the finest and largest on any railway in the kingdom.

HENRY W. HALL.

London, October 15.

### Demand for Electric Railways in England.

Mr. F. Z. Maguire, of Maguire & Baucus, New York, returned last week from a tour of Europe in the interests of his electrical and other specialties. Mr. Maguire reports the electrical traction interests of Great Britain as expanding very rapidly, and says that he considers that the greatest electrical opportunity that exists anywhere to-day is in electric traction in Europe. This particularly applies to Great Britain, where rapid transit is badly needed between towns. The people are awakening to the importance of electric traction from the success of the City electric railway, which is a short road running from Waterloo station to the heart of London. American apparatus stands the highest, and some of our enterprising countrymen should get in and link the cities together. It can be done; the people are ready for it. Americans are being received with the greatest consideration in England. Mr. Maguire says: "A wholesome respect for America has been attained by our recent war, and there is a genuine desire to increase friendly relations and do business together. Instead of projecting electric roads out into nowhere, why not let Americans make an endeavor to link the great cities of Great Britain together? I know some of the largest financial houses of London are ready for it."

### A Portable Electric Safety Lamp For Miners.

There has recently been devised a portable electric safety lamp for use in special cases when an open flame, or even one safeguarded as in the miner's lamp, would prove dangerous. The combination consists of a dry battery arranged to be carried in a holder at the belt or in the pocket. The battery is controlled by a small

FIG. 1.—INCANDESCENT LAMP FOR MINER'S USE.

rheostat, maintaining an even supply of current to the lamp, and allowing it to burn with the same brilliancy during the life of the battery. Changing an exhausted for a new battery involves no electrical knowledge. The electric lamp, connected to the battery by a flexible cord, is the miner's lamp, manufactured at the Edison Lamp Works of the General Electric Company. It is of six candle-power, and is set in a small, white enameled parabolic reflector, provided with a stick pin to allow it to be attached to the hat or any part of the clothing. The light is strong enough to allow ordinary printed matter to be read at a distance of 100 feet from the lamp.

The combination is manufactured by Elmer E. McIntyre, of Pittsburgh, and has been found very useful by gas inspectors in reading meters in dark cellars; by repair men exploring cellars and trenches for gas leaks and defective pipe connections, or examining gaseous sewers; by miners and mine inspectors in gaseous mines, where the risk of explosion even from the miner's lamp is ever present; by watchmen in powder mills and warehouses storing inflammable oils and essences, or by workmen repairing oil and gas tanks or examining the riveting inside steam boilers. This lamp is especially valuable, as it leaves the hands free, and its weight is so small—about two pounds—as to be hardly noticeable.

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A character sketch of Col. Theodore Roosevelt, dealing especially with the personal qualities of the man, will appear in *McClure's Magazine* for November. It will be illustrated by several portraits, one of them a quite recent one, taken especially for *McClure's*.

### Red Tape.

*[From the Westminster Gazette.]*

At Gleiwitz, in Upper Silesia, a youngster's kite got caught on the electric wire of a fire-alarm. A policeman noticed the accident, and, in order to get the kite removed, made a written report, which, after having been perused by the "Polizeikommissar," was forwarded in succession to the "Polizei-Inspektor," the Magistrate and the "Feuerlöschgerätkommission." The last named authority engaged an engineer to remove the offending kite, and recommended the magistrate to reward the zealous policeman with a premium of 25 pfennigs. The engineer handed in a written report to the effect that the kite had been removed. The municipal treasury paid the policeman the sum of 25 pfennigs and received in return a duly signed acknowledgment. The master of the school which the unlucky kite flyer attended (fourteen days had been spent in tracing him) received instructions to severely warn his pupils against flying their kites against electric wires, and, after complying with the instructions, reported accordingly.

But the "Feuerlöschgerätkommission" determined that the matter should not rest there. They sent a deputation to the local school board to ask that all school inspectors in the district should be instructed to see that all the children in the local schools received a similar warning. The headmasters of all the schools were accordingly supplied with written instructions as to the way in which the necessary warning should be conveyed. Circulars were distributed among the juvenile population. The head school inspector was informed of the steps that had been taken. He informed the school board, and the school board the bürgermeister. Finally the written documents relating to the affair were collected, and, after being furnished with a formidable register number, were laid to rest in an official pigeonhole. Four months passed from the loss of the kite to the final subsidence of documents and reports concerning it.

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### Electrical Instruction by Mail in New Jersey.

A meeting of exchange managers, switchboard men, linemen and other employés of the New York & New Jersey Telephone Company, from Newark, Jersey City, Paterson, Hoboken, Orange, Asbury Park, Morristown and other places in Northern New Jersey, was held recently at the office of the New York & New Jersey company, 185 Market street, Newark, N. J., when the Electrical Engineer Institute of Correspondence Instruction, 120 Liberty street, New York, was represented.

FIG. 2.—MINER'S PORTABLE ELECTRIC SAFETY LAMP IN USE.

Mr. Alfred J. Wolf, of Brooklyn, N. Y., delivered an address, describing the plans, purposes and methods of the Electrical Engineer Institute, for conveying instruction by correspondence in the various branches of electrical engineering, and was followed by Mr. Henry W. Livingston, chief representative of the Institute, who called additional attention to the educational facilities afforded and to the convenient terms of payment for courses of instruction which the Institute allows. Mr. Edward E. Winters, formerly superintendent of the New York Light, Heat and Power Company, was also present at the meeting, on behalf of the Institute, and aided Messrs. Wolf and Livingston at the close of the meeting in entering a large number of enrollments of students, chiefly for the special course in telephony.

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### Boston Interested in our Electric Light Deals.

The Boston News Bureau, in commenting on the newly organized $25,000,000 company of New York city, says:

The new gas and electric company will undoubtedly operate under one of the numerous old electric light and power franchises, because no new one can be granted under Greater New York's charter for a longer period than 25 years, and which of the existing companies will be selected will be an interesting question.

The existing New York light and power companies, with the Edison Illuminating Company (operating under licenses from the General Electric Company) at their head, have extensive plants, with annual revenues aggregating $4,500,000 and a combined capitalization exceeding that of the newly organized company; and it is well known that the Edison company has purchased a block of property upon which it will erect a mammoth electric station to extend its business.

It is the guess of some that the new company, counting upon its close relations with city officials, will proceed to install a large plant in opposition to all of the old companies and then precipitate a fight on rates in order to rapidly extend its business and to finally secure control of the whole lighting situation, as was done in Brooklyn. In such a case there is certain to be a contest, with the Edison company backed by the General Electric Company and the Morgan people. It is not improbable that some knowledge of the approaching contest led the Edison company to bid for popular favor by issuing its recent circular naming lower rates for light and power service, which act is looked upon in some quarters as the inauguration of a fight which will lead to combination against combination, the outcome of which will be awaited with unusual interest by Bostonians, who are largely interested in the situation.

## THE RELATION BETWEEN THE PUBLIC AND STREET-RAILWAY COMPANIES.

READ BEFORE THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK, BY J. T. LITTLE, JR.

It seems to be quite necessary that papers read before gatherings such as this should be upon some particular subject and duly entitled; therefore, this paper has been placed upon the programme as an effort upon the "Relation Between the Public and Street Railways." The object of a title is somewhat obscure, for the text of the paper seldom conforms with the subject suggested. So it may be assumed, there being reason in all things, that papers are labeled to enable the hearers to remember that something was read on a certain subject, and for the consequent purpose of enabling them to forego the burden of charging their minds with or listening to the contents thereof.

The relation between the public and street railway is certainly a comprehensive subject, and was selected partly with the idea that, in reply to the question of some unnecessarily inquisitive friend who did not avail himself of the feast (or the one to-night), "What was in that paper?" the delegate, relieved of the necessity of remembering, or blessed with sublime forgetfulness, may substitute some of his own experiences or ideas, with the author's full permission. Now you can not do that with such a subject as "The Metallic Circuit" or "Fenders, Their Advantage and Disadvantage," or "Low Joints—How To Remedy Them; How To Prevent Them," nor could the author be so generous as to permit it.

Perhaps it would have been better to have started in this fashion: "The Public—What they want and what they receive. What they are entitled to; and what they should grant."

Here the difficulty lies. What they want and what they receive is simply the question of the president and his operating staff trying to please 2,000,000 or 3,000,000 people, and the 2,000,000 or 3,000,000 people being pleased by the few officials. It can not be done. One can only accomplish the best he knows how. And by the "public" is meant not only those who ride in street cars, but also the property-owners, shop-keepers, municipal authorities, departments, advertisers, litigants, claimants, lawyers, ambulance chasers, injured persons, frauds, truck drivers, carriage drivers, and everything that goes to make up a community. In the successful operation of the street railway the public is an important—more, the essential factor. It must be pleased, pacified and placated. Between the public and the street railway company harmony must be the watchword, even more so than between the leaders of great political parties.

The street railway of to-day is vastly more than a mere private institution. It in no wise can be likened to the old stage coaches, no more than the steam railways can be to the post coaches so realistically portrayed by Dickens The street railway is engaged in the discharge of a public duty, and that is by no means the lesser object of its existence.

With the improvements in motive power, the street railway begins to vie with the steam railroads as a means of interrural and interurban transit. Its obligations to the public are greater than in the past; and, likewise, the reciprocal obligations of the public to the street railways are increased. However, the obligations of the railways are tenaciously guarded by the press and a horde of lawyers, while the obligations of the public are drowned in the popular idea that the railway companies are enjoying the privileges of invaluable franchises, without adequate return. The public to-day is clamoring for rapid transit—a quick and absolutely safe transportation from homes to business. The trolley car is required to run rapidly and smoothly. Its speed is required by public sentiment to be so fast as to entitle it to be compared with steam railroads, and yet a steam railroad is the owner of its roadbed, and has absolute control thereof, while a street railway shares the thoroughfare with trucks, jealous cabbies, pedestrians, aged and infirm, young and unattended. A steam railroad train stops at stations, at intervals; a street car stops on signal; and people board and alight from a street car at all places, and at all speeds. A street railway has not even full control of the part of the streets where its tracks are laid, and the public holds street railway companies amenable upon more rigorous terms than are applied to any other species of private corporation. Consequently, it seems to be ordained that the traveling public, whose cry is for speedy transportation, is beset with obstacles imposed by other conditions, while the public on the streets often vents its anger at the excessive speed of the cars, when the preoccupation of the mind has been the cause of an uncomfortable proximity to one of those moving houses, which seems in itself to stamp as frivolous the excuse of any man, in the exercise of sound judgment, "that he didn't see it." How is the public best pleased and best subserved, to the satisfaction of all concerned, is the thought here suggested?

Why is it that the presumptions are always against the street railway companies, and in favor of the public? The individual mind is the integral part of the general mind of the public, and one or two illustrations of the diversity of an individual mind might be in place.

The city of New York desired to honor the returning heroes of the Seventy-first regiment, recently. The boys were to march up Broadway, and the management of the street railway company in that city suspended the operations of the cars on that portion of the streets over which the procession passed, so as not to interfere therewith. More than that, cars were supplied to convey the sick and wounded, free of charge, to as near their destination as possible. The line of procession turned into Fifth avenue, and proceeded up that thoroughfare, crossing at Madison Square, Broadway and Twenty-third street, thereby blocking four or five lines of street railways for half an hour or more. As might be supposed, a crowd of many thousands gathered to cheer the returning soldiers; Broadway cable cars were used by the public as reviewing stands, until it seemed they would topple over on the weighted side. A man, somewhat anxious to get downtown, dropped into the first car of the blockade, and, having no chance to see the parade, took a seat on the opposite unoccupied part of the car. Presently the procession had passed, the car started up, those who had used it for a reviewing stand (free) got off, and several thousands attempted to get on. A progressive American public could only be satisfied with the first car. One half minute would be unnecessarily lost by waiting for the next car. The car being filled to its extreme capacity, a lady boarded it and succeeded in forcing her way to the center of the car, carrying innumerable parcels and an umbrella. Handing her umbrella to a passenger, seated, she said: "Kindly hold my parcel while I get my fare. They don't deserve it, though I suppose I must pay it." Why didn't the company deserve it? It is suggestive of the illogical "No seat, no fare" bill, as applying to a street railway engaged in carrying an American public It was in a boarding-house where the idiot—it must have been John Kendrick Bangs's idiot, it could not have been any other—got his innings. A fellow boarder having been compelled to stand a few blocks in a crowded car—because all of the city at that time wanted to travel in the same direction as he did, and the crowd was so large that a continuous circuit of cars could not have accommodated it—commended the municipal legislature upon its serious consideration of the "No seat, no fare" bill, advancing the old arguments of London and Paris ordinances. The arguments of his fellow boarders, that the geographical condition of those cities are different from his, and that the greater traveling is done in cheap cabs, were of no avail. It was then that the idiot, bless him, inquired if there was a vacant seat in the car which the indignant one had boarded, and, being answered no, that it was crowded, calmly asked if the legislature would be justified in making it a misdemeanor for a person to attempt to board a car already filled to seating capacity, or if that would be an imposition upon the rights of American citizenship, and quietly left the dining-room.

In New York city the Metropolitan Street Railway Company started in the Spring of 1897 to change the motive power on Sixth and Eighth avenues, necessitating the expenditure of several millions of dollars. The shopkeepers along these avenues were in a state of ecstacy. When, however, injunctions piled in, and litigations over the ownership of the franchises were begun, it was thought expedient, out of deference to the court, to stop these operations; and the shop-owners were wrathfully indignant. What was the expenditure of a few millions of dollars by a railroad company, or an injunction of a court, to them? This present Summer, the injunctions having been dissolved and the litigations decided, the railway company began to push the construction as rapidly as possible, and for that purpose stopped the operation of the horse cars on those streets for a few weeks in the mid-Summer. Again the shopkeepers' indignation was masterly. The erroneous popular impression, that the stopping of a car forfeited the franchise of the road, was paramount in their minds, but only for the purpose of using it as a hammer to compel the company to operate its cars. Their conduct reminds one of the county supervisors in one of the interior counties of the state, who had determined to rebuild the county jail. Resolutions were adopted something in this order:

"*Resolved*, That the county jail be rebuilt.

"*Resolved*, That the stone in the present jail be used in the construction of the new jail.

"*Resolved*, That the present jail be not demolished until the new jail is completed."

Such illustrations give an insight into the minds of the public, and the little things with which the railroad executives have to contend, and convey, to some extent, an idea of the construction of the great minds of the mass of the complaining and unappreciative public.

The department that has to contend most closely with the public, and whose task is infinitely great and responsible, especially in large cities, is the legal department. The convincing of juries of right and justice, overcoming of prejudices, allaying of sympathies, and destruction of perjured testimony, is a task of enormous difficulties. It would take too long to speak in detail of these matters; they constitute a volume in themselves. But how truly representative of the public is a jury, susceptible to all of nature's influences, emotional and often revengeful. The purchase of supplies for the company is regulated by the well-nigh stable laws of supply and demand. The market is an open one. The purchasing agent knows the market value of all his needs; the officer knows where cars and equipments are to be had, and their exact cost; the construction is most accurately approximated. But where is the limit of the award of the jury in damage cases? Has not that representative of the public the vitals of the railway company within its grasp? No one can approximate, or prophesy, the outcome of a jury trial. Few know the difficulties attending

the preparation and trial of the defendant's case; the discovery of fraud; the defeat of so-called "fake" cases. At the present time the business of the class of so-called lawyers who relentlessly pursue an injured person and beg and implore him to bring suit, and often buy the claim outright, is far in excess of that of any other class of "shark practitioners." Often, in New York city, an injured person, in an hour after the injury, will have the cards of 30 different lawyers in his possession, and the representatives of half that number will have personally interviewed him. In some instances, as many as five suits against the company have been brought by different attorneys for the same injury. In the hands of most of these lawyers, the simple fact that an accident has happened is sufficient for them to build a "jury case," and then it depends upon the fairness and integrity of the jury to see that justice is done.

It will be seen, therefore, that the street railways support and nourish a large class of the community, consisting of these accident, or ambulance lawyers, and their staff of chasers and assistants, and is deserving of some, negative perhaps commendation therefor. In passing, the suggestion is offered that in many instances a street railway corporation fulfills the function of an eleemosynary institution, for no juries ever know how many cases are settled, and no one knows, but the alleged injured party himself, how often peace has been bought of a fraudulent claimant for a small sum. And although the street railway company and the weather are the two things of which every one feels entitled to complain, the majority of the public seem to be appreciative of the efforts of the companies to fulfill their obligations and promote the convenience of the people, and often a citizen is said to be suffering in silence when a cable has broken down and he is delayed half an hour, because he has patiently endured, with the company, the annoyance of an accident that might have befallen him in his own carriage, instead of demanding transfers, the Alladin-like appearance of another fully equipped car and road, having himself arrested, and bringing several suits against the company "in the interest of the public," as one poor deluded man has already done to a New York company.

The public, in spite of all, is appreciative; and let us consider for a moment what it appreciates. Improved and rapid transportation is now acclaimed throughout the land; villages that were miles apart and dependent upon the one or two steam railroad trains a day for their commercial intercourse, are brought in close contact because of the continual service of the trolley; the property en route is vastly enhanced in value; it is brought within easy approach, and loses its isolated character. In cities, the extensions to the suburbs gives the mass of the people better homes, purer air, easier, cheaper and quicker transportation, building up and populating of the outlying suburbs, and lightening the dense population in the tenement districts, besides giving employment to thousands of persons. It is essentially an institution of service to the great poorer classes, affording them cheap and rapid transportation, healthy, pleasant and accessible homes, and in the heated term, the only means of beneficial and cool outing.

For the benefit of those who often raise their voices for a three cent fare, let it be said that in New York city the extensive transfer system now in existence reduces the individual fare to three cents, and when an inspection of the vast machinery, extensive power-houses and underground construction is made, and the continual repairs, endless rolling stock and great army of employés is considered, is it not a minimum fare for the benefits extended?

This paper is not intended to be instructive. If the president had asked for an instructive paper, this would not have been heard. Lawyers seldom can instruct; the best they can do is untangle knots, and oftentimes it needs the assistance of three courts to accomplish that, and seldom to the satisfaction of any of the parties interested.

The relation of the public with the street-railway company must be reciprocal, and is and has been growing so friendly and so closely allied as to cause some fear for the future. The time may come when the public will ride on free passes, when the people will not be injured, when the word accident will be obsolete, when the supplies, provisions and motive power will be furnished by some public spirited citizens, and the capital of these enormous enterprises be the gift of some of our millionaire philanthropists. Surely the millennium will then be at hand.

## New York Electrical Society.

By courtesy of the company, the 190th meeting of the society will be held at the Pearl street sub-station, Brooklyn, of the Edison Electric Illuminating Company, of that city, on Thursday, October 27, at 7.30 P. M.

After an address on the company's work by Mr. W. S. Barstow, chief engineer, a brief inspection of the station will be made. The rest of the evening will be devoted to a flying visit to the sub station "A," (formerly the Citizens' station), and the big Union Central station at Bay Ridge. Special parlor cars will be ready to take the visitors from the Pearl street station, and on the return trip from Bay Ridge a collation will be served on the trolley train.

In returning, for convenience of the New York members, the Brooklyn Heights Railway Company has kindly arranged to run the parlor cars to the New York end of the Brooklyn Bridge.

## Electricity and Asthma — and Wooden Electrodes.

TO THE EDITOR OF ELECTRICAL REVIEW:

I am sure that the ELECTRICAL REVIEW does not knowingly intend to sneer at electricity or betray ignorance about the oldest form of current, hence you may welcome the little information which would have saved your issue of October 12 from doing you injustice. The second editorial paragraph in that issue was as follows:

A daily newspaper says that a little girl was recently cured of asthma in St Louis "by the application of static electricity applied in spray form through wooden electrodes." Will wonders never cease?

I do not know whether your "wonder" is excited by the "spray form" or the "wooden electrodes" or the "cure" of the asthma, but a very trifling clinical investigation of the subject will place each of these "wonders" in about the same category in your mind as that now represented by the "wonder" of an ordinary telephone call. Asthma is a reflex neurosis, characterized by recurrent paroxysms of violent dyspnœa. The "wheezing" and paroxysms of dyspnœa are due sometimes to spasm of the muscular coats of the bronchial tubes, sometimes to tumefaction of their mucous membrane from capillary vaso-motor disturbance, and sometimes both of these conditions may be present. The spasms may be reflex from gastric or uterine irritation. Irritation, a sensitive nerve center and a vulnerable area of mucous membrane are the factors involved in an attack of asthma.

It is more than 70 years since Dr. Wilson Philip made his well known experiments in the electrical treatment of asthma, and published 22 cases. Every physician to-day who has a modern static apparatus and is properly taught its use undertakes to treat asthma as confidently as he treats sciatica or rheumatism. Chronic diseases, however, are not "cured" by ledgerdemain, and most cases of asthma require both skilled and persistent treatment before they are "cured." Static electricity in skillful hands is, however, one of the best remedies for patients afflicted with asthma. The "wooden electrodes," which I presume you regard as non-conductive, and hence useless, were first made about 1771 and have ever since formed part of the set of electrodes supplied with static machines. I can show you their uses so that you will comprehend. The "spray" has been a valuable method of using the static current ever since the machine was improved by Ramsden in 1760. The powerful Holtz machine now makes this type of current more useful to the expert physician than any half-dozen drugs.

S. H. MONELL, M. D.

Brooklyn, October 12.

[It was the "wooden electrodes," Doctor, that caused the astonishment. In your own book, "The Treatment of Disease by Electrical Currents," you say "All electrodes require a conducting surface and attachment to conductors." Wood is usually classed as a non-conductor.—ED.]

## NEWS OF THE TRADE.

**The Brown-Bierce Company,** Dayton, Ohio, designers and engravers by all processes, make a specialty of fine machine engraving and catalogue illustrating, and their work is always of the highest grade. Their business has been a rapidly growing one, and they have a modern and up-to-date plant in every respect. Correspondence with them should result favorably to those in need of their services.

**The Utica Belt Line Railroad Company,** Utica, N. Y., are erecting on the line of their road a new riveted lattice bridge having a span of about 75 feet. The bridge is known as the Half-way Bridge. It is a modern structure in every way for the class of work which it is called upon to do. It is to be all steel except the cross ties on which the rails rest. The Berlin Iron Bridge Company, East Berlin, Ct., have the contract for furnishing and erecting the steel work.

**The Entire Plant** of the Fish Brothers' Wagon Company, Racine, Wis., has been equipped with electrical transmission of power and light. The switchboard placed in the plant is one of the largest electrical switchboards in the northwest. The entire equipment was furnished and put in by the Julius Andrae & Sons' Company, Milwaukee, Wis. The company's new catalogue on telephones and electrical supplies is now ready for distribution and will be sent to any address free of charge.

**Goldmark & Wallace,** of 123 Worth street, New York city, agents for the well known Koch dynamo brush, report a large increase of orders during the past month. The brush is attracting considerable attention throughout the field, and several letters, similar to the following, have been received by the firm complimenting them on the merits of the brush:

YREKA ELECTRIC LIGHT COMPANY, September 25, 1898.

GOLDMARK & WALLACE, Worth street, New York.

GENTLEMEN—In answer to yours of the 19th inst., would say, about five months ago we sent to you for a set of Koch woven-wire brushes, plain, one and one-half by three-eighths. We run the brush alternating system, and the only trouble we ever had was with the brushes on the exciter sparking. We have tried every brush advertised with but little satisfaction until this last order of Koch. When you say they run cooler, sparkless, requiring but little attention, you speak the truth and I will swear to it. *Thanks*, we need no sample; from this on you may set this plant down as a steady customer. They keep the commutator cool and glazed, no trouble whatever.

Yours truly,

JAMES QUINNE, Proprietor.

## TELEGRAPHING FROM A BALLOON IN WAR.

BY PETER J. DELANEY, IN THE NEW YORK "WORLD."

I am the telegraph operator who went up in the war balloon at El Caney and Santiago, and this is the first story of the ascension. The balloon was shot full of holes so that it looked like a sieve when it dropped. I received a glancing shot over the eye, leaving a scar that I will carry for life.

The balloon service proved practically a failure, but the experience was filled with thrilling incidents which I am not likely to forget. I don't want any more of it.

The balloon was one of four, and was the only one used. It was under charge of the signal corps. I made four ascensions. Lieutenant McNorn was in command, "Bud" McKalb was the aeronaut and I was the telegrapher. I enlisted on May 27 in the Seventh Company, United States Volunteer Signal Corps, and went to Cuba in June. I was told that I was in this balloon detachment. I did not relish the job, but I was out there to obey orders, and that was all there was to it.

The gas was manufactured for us at Tampa and sent over to us in tubes, so that there was no trouble in getting to work for our first ascension on June 29.

The balloon was laid out over the rough, hilly ground, and in 40 minutes it was filled with gas. The Spaniards began to fire at it the first crack of the box, before it was five feet off the ground. But their shots were few and scattered, and at 11 o'clock the balloon was ready for the first trip. It was a wet morning. Rain was falling heavily and the balloon sagged until it swung to a height of 1,500 feet.

The first trip was really without exciting incidents. A few pickets fired at the balloon, but did no damage to speak of. We could see the Spaniards in their intrenchments, our own men in camp and our ships at sea. The telegraph line extended to Camp Greeley, and worked perfectly.

All the messages were sent in cipher. We sent the location of the enemy's lines, as we could see them, but had no trouble. The second trip on July 1 was quite like the first. We heard a few scattered shots, took similar observations, and put in about two and one-half hours on the work.

The third and last trip was at Santiago on the morning of July 3, and I am telling you it was a trip to make a man's hair turn white. The fighting lines had been getting closer for three days, and I knew that we were in for a hot time. The lieutenant knew it, too, and I remarked to "Bud" that it would be a lucky morning for us if we all got back alive.

It took 40 minutes to pump the bag full of gas, and at 11 o'clock we were ready for this day's work. There was a nasty rain on; it rains there all the time. I can feel it raining now. We wrapped rubber ponchos around ourselves, adjusted the telegraph machine and got into the basket, which was about five feet deep and four feet across. There was just room for three men and the instruments.

Twenty or thirty of the boys who assisted in the rigging of the balloon gave us the good-by, and as the balloon swung slowly upward I heard different shouts:

"Delaney, try and land on your feet!" and another yells "It is a long jump from up there, old man!"

I said to myself that there was no use of thinking about it. If I was in to get shot, that was all there was to it. There was no chance to get back at the dagoes, for I only carried a revolver. We had all the worst of it if it came to a fight, for the balloon was an easy mark.

The balloon rose about as fast as a cable car runs, and for the first 20 or 30 feet in the run we did not hear a shot. The bag was drifting well over the water when we heard the first "ping, ping!" of the Mauser bullets across the side of the basket and against the bag. When the bullets came singly it sounded like they were striking against a stone wall.

A few holes in the balloon did no damage, and we kept on rising, though it was a sure thing that we were in for trouble. We knew that the Spanish firing line was within 1,500 feet, and that they had the range on us.

The lieutenant leaned over the basket with his glass to his eyes, writing a message now and then. All the messages were in cipher. For instance, I remember one which he wrote on a leaf of his note-book, and which read:

"Adrift, abaft, abhor, abhorrence."
"M'NORN."

Now, this might mean that the enemy had so many field guns and the intrenchments were so many, or it might mean something else. I was not supposed to know anything about that. I ticked down, perhaps, a couple of bulletins a minute. Between messages I looked over the basket and saw a few strange sights as the balloon was swinging upward. You see the Spaniards suddenly stopped firing on us.

A thousand feet below I saw a Spanish sharpshooter drop out of a tree once in a while, and I could tell by the way that he dropped that his fall was no accident. He was knocked out; that was a sure thing. Then I could see the Spaniards crawl through the tall grass to their intrenchments.

The aeronaut, "Bud," was quietly sailing the balloon, moving a lever now and then to change the rise or fall, and he and I were carrying on a quiet talk. I looked over the basket and remarked:

"'Bud,' there drops another dago from a tree;" and "Bud" answered, "Say, that fall was easy to the one we will get."

Well, the balloon was probably to its full height—1,500 feet—and I was pushing away on the ticker when trouble began. It seemed as if the Spaniards had turned all their guns upon us. The noise of those Mausers against the bag was like 40 hod-carriers falling down ladders with their hods.

The aeronaut crouched down in the basket, hanging on to his lever, while Lieutenant McNorn stood at his place, glass in hand, and kept on writing dispatches. The bullets were flying like hailstones by the basket and into the bag, and striking it in a storm.

Nobody was rattled. We kept right on playing ball. I expected that the big bag would be ripped in a thousand pieces, and that it would fall like a lot of bricks. Instead of that we began to gradually descend. The balloon was being plunked full of holes, but very little gas was escaping.

The rain of bullets never let up for a second. "Bud" had just asked me if I wasn't getting a little nervous when he yelled, "My God, they've got me!"

He dropped over to the bottom of the basket with two wounds, one in his left groin and the other in his left foot. I noticed two holes in the basket as he dropped the lever. I had just been wondering who the first man would be. The lieutenant looked around and asked how badly the aeronaut was hurt. Then he said:

"Now, I have got to stand here and watch out, and if 'Bud' gets so bad that he can't handle the lever you do his work and your own, too." Then he wrote on a sheet of paper from his note-book:

"Bountiful. M'NORN."

This message meant "One man shot."

But the rain of bullets was doubled, probably because the Spaniards saw they were getting the best of us. I couldn't understand why the balloon did not fall like a dead weight until I was told later that the holes closed up almost as fast as the bullets came through. There was now enough gas escaping to cause the balloon to drop faster.

The basket was swaying from side to side as the balloon shifted. The outlook was very "leery," for I expected every minute that the balloon would rip, and there was nothing below us but water.

Lieutenant McNorn was as cool as ice. He had just written a dispatch and handed it to me when he was hit. He was standing close to the edge of the basket. The basket had taken a sudden turn when he fell with his head across the edge of the basket and a bullet in his right side.

Then followed the hottest 10 minutes of my life. I caught the lieutenant with one arm and drew him back into the basket, which was swinging so that it was a guess whether we wouldn't all be spilled out at the next turn.

With the other hand I telegraphed to my friend Considine at the other end:

"The lieutenant is hit. I am holding him up with one hand and wiring with the other. I don't know how badly he is off, but it looks like '30' with him."

It was a hard place for fair, and I was scared more over falling out of the basket than from the bullets that kept swarming. Considine wired back:

"Keep your nerve. The balloon is coming down easy, and we will stand by until it touches the land."

I was covered with the lieutenant's blood and he was unconscious. The aeronaut was breathing but could do nothing. With my free hand I again wired to Considine:

"Get the ambulance and the doctors. They have missed me but the other men are unconscious."

I was told afterward that it was 12 minutes by the watch between the first message from the balloon and the landing. It seemed like 12 years. I stuck my head over the edge of the basket to see how the balloon was drifting and I thought that there was a chance when I saw it turning to the land. For perhaps two minutes before the landing the shower of bullets let up.

Finally the basket grazed the beach and I climbed out. My feet were fairly on the ground when a sharpshooter's bullet struck my face under the left eye and covered my head with blood. It was a lucky shot and pained me, but I knew that it was not serious.

The boys ran up and carried the lieutenant and aeronaut from the basket, and I turned around in time to see the big balloon collapse slowly to the ground. The aeronaut will pull through, but McNorn is still in the hospital and is in bad shape.

## Large Orders For Spiral Riveted Pipe.

The great strength and durability of this style of water-pipe, the ease with which it may be handled, and the fact that it is not liable to give trouble through leakages, has brought a steadily increasing demand for Root's spiral riveted pipe. The Abendroth & Root Manufacturing Company, 28 Cliff street, New York, sole manufacturers, report a number of large orders recently received. To the Sheely & O'Shee Company, contractors, of Lincoln, Neb., they have lately shipped 12,000 feet of their pipe, which will be used in extending the waterworks at Lanesboro, Minn. About 10,000 feet have been sent to Milledgeville, Ill., and 15,000 feet to the city of Augusta, Wis. The United States Water and Steam Supply Company, contractors, Kansas City, have placed an order with the company for about 5,000 feet of pipe, which will be used at Concordia, Mo., and 6,500 feet are to go to J. L. White, contractor, Wyoming, Ill.

## An English View of the United States Patent Office.

[*From Engineering, London.*]

There are vast numbers of persons in this country who entertain a very genuine admiration for the patent system of the United States. They are under the impression that a patent issued there is a positive proof of the novelty of the invention to which it refers, and that it is a document which can not be impugned. Unfortunately, this belief has a very slender foundation The courts of the United States do not share it, for in most cases they utterly decline to accept a patent as reliable evidence. If application be made to them to issue an injunction against an infringer, they consistently refuse to do so unless the patent has already been established in a court of law, or has been accepted for such a time as affords great presumption that it can not be successfully attached. Capitalists are following in the same course, and they no longer purchase patents until they have been advised by experts that there is good reason to believe they can not be upset. There never was a time in the States when the official examination afforded the certainty that no anticipation of a patented invention could be discovered, but some years ago the presumption of validity of a patent was much greater than it is now. The reason of the decline is that the Patent Office staff is grievously overworked, and has to content itself with much less than an exhaustive search into existing documents. The examining corps comprises 200 persons and in 1897 they took in hand 44,546 applications. This is 223 per man, or, allowing seven hours' work per day on 280 days in the year, at the rate of 8.8 hours per application. Any one who has ever made a search in the British Patent Office will understand how totally inadequate such a time is for examining the patent records of only one country. But in the United States they profess to compare an invention with the patent specifications of all countries, so far as they are obtainable, and also with records in books and periodicals. Evidently it is quite impossible to do justice to such a search unless a large amount of time is given to it, and, no matter what pains are spent, it is impossible to be certain that in some technical journal the invention has not been described. The indexes of many, if not most, periodicals afford but a very faulty clue to their contents.

The paucity of the examining staff at the United States Patent Office is not due to want of funds. Last year the office paid into the Department of the Interior £275,128, and drew out for expenses £224,568, leaving a balance of £50,560. This goes to the general funds of the country, and furnishes another example of how little the value of the inventor is understood by politicians. They make speeches in his praise when it suits their purpose, but they will not even spend upon him the fees they demand for registering his productions. The grant for the Patent Office is voted by Congress, and it seems impossible to obtain from them adequate funds. Last year a demand was made for 86 additions to the staff in various grades, but none was granted. Further, the salaries are inadequate, with the result that the most capable men are always leaving, and their places have to be filled by others, who, whatever their ability, are untrained and lacking in the kind of experience needed. In consequence of the smallness of the staff, and the constant changes, the examination of specifications is not only hurried, but the Office is getting into arrears. It now takes several months before an inventor can learn whether his application is to be granted, and if there is any dispute the matter may drag on for a year or more. This represents a great loss, for until the patent is assured it is not safe to embark capital in exploiting the invention.

There, further, is great need of a comprehensive index in which all existing patents shall be classified, and plans for its creation have long been in existence, but they have not been executed from lack of funds. In the sale department for specifications, confusion reigns. If a number of copies be ordered, days, and sometimes weeks, elapse before they are delivered, simply because there are not sufficient men to look them out. The pamphlets themselves, according to the report of the Commissioners of Patents for the year ending December 31, 1897, "are stacked in every available nook and corner of the building from garret to basement, filling the corridors and overloading the west wing of the building far beyond the limit of safety. They have become . . . so filthy that the work of selecting copies is about as cleanly and healthy as work in a coal pit."

In every department there is the same difficulty caused by want of funds. The record of assignments is weeks behindhand; the library, although very valuable, needs £2,000 for the purchase of necessary books, and an annual income of £1,000 a year for the future; the laboratory is quite inadequate for the solution of scientific questions which have to be decided. In nearly every respect the United States Patent Office is falling away from the high ideal of those who instituted it, and failing to render the inventor that assistance and assurance which it has always been its boast to afford. This is not from any want of zeal or ability on the part of the officers, but simply because Congress seizes its revenues and applies them to purposes for which they were never intended. We have always held, and have often pointed out, that the examination system of the United States is quite incapable of furnishing any conclusive evidence of the validity of a patent, but, nevertheless, if properly carried out, it may be of great use in saving inventors from spending their time and money on projects which are undoubtedly old. But, imperfectly carried out, it is likely to do nothing but harm, at least until the knowledge of the untrustworthiness of its searches becomes general. In the meantime, it gives a fictitious value to inventions which, but for the faith which exists in its decisions, would be independently investigated by those who come to take an interest in them.

In one respect the United States Patent Office has done good work during the past year. It has inaugurated a register of "patent solicitors," and will only recognize those so enrolled. Further, a bill to provide a penalty for those who secure fees from would-be patentees on the false representation that they are entitled to represent them before the Patent Office has been introduced before Congress. There have been very grave scandals under the old rule that "any person of intelligence and good moral character may appear as the agent, or attorney in fact, of an applicant." Only last year an attorney, whose practices savored of the confidence trick, and who had obtained hundreds of thousands of dollars for which he had given no adequate services, was denied the privilege of practicing before the Patent Office, and was further denied the use of the United States mails by the Postmaster-General. In inaugurating this register the United States Patent Office is following our action here, which has been attended with nothing but good, and which, in course of time, will raise the status of the patent agent to the position befitting the legal and scientific knowledge demanded of him. Whether the niggardliness of Congress in the matter of funds will not soon put the American patentee on the same footing as the British, that is, give him the right to prove his claim in a court of law, and nothing more, remains to be seen. At present he has to suffer great delays, and too often has to meet most provoking objections due to the hurried manner in which the examination is made Whether "it is worth while to go through so much to gain so little" is a matter for his consideration, but most people will think that the only justification for a system of examination is the confidence it creates for itself, and when this is shaken it is time for the system to be either ended or mended. Considering how money is lavished in America on pensions, the civil service and other matters, it is strange that the Patent Office can not even spend its own funds on carrying out the object which is claimed to be its leading and most important feature.

## A Fine Industrial Exhibit.

The exhibition of the Massachusetts Charitable Mechanics Association at Mechanics Building, Boston, was opened October 10 with a wonderful display of industrial products. The building is the one of which a part was used for the recent street railway exhibition. The electrical features of the exhibition are quite noteworthy. Some of the features are: The wax tableaux illustrating the successive stages of electrical development, which were exhibited at the last electrical exposition at Madison Square Garden, New York; Clark's modification of the Marconi system of wireless telegraphy; electrical exhibition of submarine mines. In the manufacturing interests the Diesel caloric motor is being exhibited; Messrs. Whitman & Couch, telephone manufacturers, of Boston, have a most complete series of electrical instruments of all kinds; the Jandus Electric Company, makers of the "Jandus" arc lamp, have an attractive exhibition; also the Buckeye Electric Company, makers of the "Buckeye" incandescent lamp. These two companies are represented by Mr. H. T. Edgar, the New England agent. The Burton Electric Smelting Company, of Boston, have a practical demonstration of metal working and smelting by electrical processes. The Eaton Electric Motor and Carriage Company, of Boston, show a number of the modern forms of electric vehicles. The Edison Electric Illuminating Company of Boston have an elaborately prepared booth showing the great variety of purposes for which the electric current for domestic and other uses may be adapted. The General Electric Company have allowed the mammoth globe of the earth, which was placed in position for the street railway exhibition, to remain. In addition to this, the General Electric Company have placed at the disposal of the association the complete equipment of generators and motors which supply all the motive power supplied to the exhibitors by the association. The controlling and regulating mechanism for both dynamos and motors are also supplied by the General Electric Company, together with the greater part of the arc lamps which illuminate the building. John A. Roebling's Sons Company exhibit a sample board of electric wires and cables. The Sampson Cordage Works also display their manufacture of braided cord in a variety of sizes, materials and colors, particularly those adapted for electrical purposes. The Standard Thermometer and Electric Company have furnished a variety of forms of the Upton "Midget" arc lamps and the gallery of Exhibition Hall is lighted by this company.

The general appearance of the exhibition is one to excite admiration. The interior of the building is elaborately and beautifully decorated and the unique illustrations of the manufacturing arts is a liberal education in itself to those of a practical mind. The exhibition will remain open until December 3. A nominal entrance fee is charged.

## ADVANCE INFORMATION

### Increase of Capital.

WINDSOR, OHIO—The Jefferson & Warren Telephone Company has increased its capital stock from $10,000 to $2·,000.

NARRAGANSETT, R. I.—The Narragansett Electric Light Company has increased its capital stock to $800,000.

### New Electric Railways.

CINCINNATI, OHIO—The Cincinnati, Milford & Goshen Street Railway Company has been incorporated; capital stock, $10,000. Incorporators, William A. Goodwin, Frederick E. Neiderhelman, William C. Compton, L. C. Goodwin and S. W. Kittering.

PALMYRA, N. Y.—An electric railroad between this place and Marion is being discussed, and the agitators are engaged in securing the right of way. An effort is soon to be made to secure the pledging of capital, of which it is claimed about $60,000 is required.

DETROIT, MICH. — The International Construction Company has secured contract for building an electric railway from Cincinnati to Hamilton, Ohio.

JOHNSTOWN, PA.—A charter has been granted to the Johnstown & Somerset Traction Company, a corporation organized to build and operate a trolley line from Johnstown to Windber, the new coal town of the Berwind White Company in Somerset County. The board of directors are Charles S. Price, Morris L. Woolf, David Barry, Herbert H. Weaver and Fred Krebs, local business men. Rights of way have been secured for the line, which will be seven miles in length, and the work will be taken up immediately.

### New Incorporations.

JERSEY CITY, N. J.—The Insulated Wire Company has been incorporated by Samuel B. Lawrence, John B. Summerfield and Burnham C. Stickney to deal in insulated wire and other goods, wares, etc.; capital stock, $500,000.

MONTGOMERY, W. VA.—The Kanawha Electric Company has been incorporated with an authorized capital of $25,000, of which amount $500 has been subscribed.

### Electric Light and Power.

FERDINAND, IND.—The new electric light plant at this place is now in operation.

HUNTINGBURG, IND.—The establishment of an electric light plant for this place is again being agitated.

LAWTON, MICH. — Lawton has voted to bond the village for $5,000 for electric lights.

SHELBINA, MO. — The electric light plant at this place is again being enlarged.

SPARTANSBURG, S. C.—The Aetna Light and Power Company, recently purchased by New York parties, will probably improve and enlarge its lighting plant and resume operations.

WINCHESTER, VA. — The Winchester Gas Company contemplates installing an incandescent electric lighting plant.

GALLATIN, TENN. — City Clerk may give information concerning electric light plant.

PINE BLUFF, ARK.—Walter S. Jeter can give information concerning erection of electric light plant.

NEW ORLEANS, LA.—The Crescent City Electric Company will erect a power station to be equipped with 1,000 kilowatts.

MONROE, LA.—The Mayor may be addressed concerning proposed electric light plant.

NATCHEZ, MISS.—The Natchez Gaslight Company is extending its service.

FLORENCE, ALA —Frank M Perry contemplates the establishment of an electric light and power plant in connection with several other enterprises now building.

MIAMI, FLA.—An electric light plant is to be established by Mr. Flagler.

MACON, MO.—The Northwestern Electric Heat and Power Company has been incorporated; capital stock, $30,000. Incorporators, F. W. Blees, John F. Schafer and Charles E. Roehl.

SHERMAN, N. Y.—A company has been formed for lighting the residences of this village with electricity. President, J. L. Thayer; vice-president, Frank Cornish; secretary, T. J. Newell; treasurer, Chas. Corbett.

### New Telephone and Telegraph Companies.

HAZEN, ARK.—The Grand Prairie Telephone Company, with Geo. D. Foster, J. G. Thweats, J. M. McClintock, A. L. Aydelott, David Brockaway and others as incorporators, has been incorporated; capital stock, $10,000.

NEW YORK, N. Y.—The People's Telephone Corporation has been incorporated, with a capital stock of $5,000,000, to operate a telephone system in this city and in other cities, towns and villages in New York and other states, and in the Dominion of Canada. The directors are S. B. Dutcher, J. E. Nichols, E. S A. De Lima, Francis C Travers, Frank Brainard, J. Fred Ackerman and Darwin R. James.

HILLSBORO, HILL COUNTY, TEX. —The telephone line from Hubbard has been completed, and connection made with the southwestern telegraph office here. This gives telephone connection with Massey, Rienzi, Zeevee and Hubbard.

FLORESVILLE, TEX.—A telephone line is now in operation between here and San Antonio.

DENVER, COLO.—The San Luis Valley Telephone Company is extending its line from Monte Vista to Seaton's ranch.

CHICAGO, ILL —The National Automatic Telephone Company has been incorporated, with a capital stock of $150,000; incorporators, John Anderson, E. W. Ober, W. W. Watson, C. A. Watson, L. A. Will, of Salina, Kas; F. A. Lundquist, Chicago; J. D. Milliken, McPherson, Kas.

BROOKSTON, IND.—The Prairie Telephone Company has been incorporated; capital stock, $10,000.

BALTIMORE, MD.—The Chesapeake & Potomac Telephone Company contemplate establishing an exchange at Pikesville, Baltimore County, similar to the one in operation at Catonsville.

CHARLESTON, W. VA.—The National Automatic Telephone Company, principal office in Chicago, Ill., has been incorporated by John Anderson, E. W. Ober, W. W. Watson, C. A. Watson, L. A. Will, F. A. Lundquist and J. D. Milliken; authorized capital, $1,000,000.

LEWISTON, ME.—The Lewiston & Greene Telephone Company will commence at once to extend its line to this place.

ELLENVILLE, N. Y.—The Hudson River Telephone Company has just completed its new line between this place and Middletown, and it works perfectly.

MAYSVILLE, KY.—A company is being organized to build a telephone line from this place to Germantown.

ELDORA, COLO. — The Colorado Telephone Company is putting in new wires to replace the telephone system recently established to this place. The work will be completed in a few days.

### Increase of Capital.

ALLENTOWN, PA.—The Sterlingworth Railway Supply Company has increased its capital stock from $150,000 to $200,000, in order that it might increase its plant at Odenweldertown.

TORRINGTON, CT.—The E. A. Perkins Electric Company has increased its capital stock from $5,000 to $20,000.

PORTLAND, ME.—The New England Automatic Telephone Company has been organized for the purpose of conducting a general telephone business, with $500,000 capital stock, of which $150 is paid in. The officers are: President, Charles H. Adams, of Boston; treasurer, William W. Lowe, of Boston.

PATERSON, N. J.—The Weismantel Fearless Car Fender Company has been incorporated. The capital stock is $250,000, of which $150,000 has been paid in. The incorporators are Michael L. Muller, of Brooklyn, 745 shares; Augustus Weismantel, of Brooklyn, 750 shares, and Robert W. Dunlop, of North Paterson, five shares.

CINCINNATI, OHIO—The Protective Automatic Fire-Alarm Company has been incorporated; capital stock, $100,000; incorporators, Frank K. Ludlow, W. R. Vaughan, Jr, Charles E. Brown, Irvine K. Mott and John A. Caldwell.

NEW YORK, N. Y.—The Nilsson Power Company has been incorporated by F. E. Mygatt, P. A Brown and S. F. Patterson to manufacture machinery; capital stock, $5,000.

NEW YORK, N. Y.—The Wilson Power Company has been incorporated to manufacture machinery; capital, $5,000; directors, F. E. Mygatt, Brooklyn; P A. Brown and S. F. Patterson, of this place.

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# Electrical.... Patents.

(Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.)

ISSUED OCTOBER 18, 1898.

612,410 Electric trolley device; A. J. Cairing, Johnstown, Pa.

612,426 Electric meter; W. D. Marks, Philadelphia, Pa.—Consists of a controlling arch, the position of which is determined by an ampere indicator, a pawl-carrying armor lever co operating with said arch and effecting the registration, a shaft extending through said arch, a driving-cam carried by said shaft for actuating said pawl-carrying lever, and a motor for driving said shaft.

612,427 Electric meter case; W. D. Marks, Philadelphia, Pa.—A casing for electric meters, comprising a box, a frame carried upon the front of said box and secured to the lower wall thereof, a screw for connecting the upper part of said frame to the upper wall of said box, and a seal for said screw.

612,441 Electric time alarm; H. D. Tenny, Milford, Mich.

612,457 Electric railway; C. H. Myers, Buffalo, N. Y.—A turn-table, a hanger attached thereto, an arm pivoted to said hanger and carrying a traveler, and an adjusting lever mounted on the turn-table and operatively connected with the arm.

612,535 System for insulation of electric conductor wires; J. H. Vail, Philadelphia, Pa.—An electric conductor having an insulating covering for a portion of same, consisting of a plurality of sleeves, one within another, each sleeve being split, and having its joint or line of division breaking joint with the joint of the adjacent sleeve.

612,556 Electric arc lamp; C. A. Vigreux, France.

612,560 Electric lamp socket; J. E. Criggal, Newark, N. J.

612,629 Means for controlling operation of electric motors; J. D. Ihlder, Yonkers, N. Y.—In a starting and stopping device for electric motors, the combination with the motor, of a resistance included in the circuit of the motor, and a series of electromagnets automatically operated according to the varying potential of the motor armature arranged to control said resistance.

612,644 Depressible rail system for electrical railways; W. Grunow, Jr., Bridgeport, Ct.—Contact receptacles, a feeder cable passing into said receptacles, a supporting connection or joint overlapping the end portions of a service conductor, provided with means to close the circuit and charge the service conductor.

612,649 Battery electrode; H. S. Lloyd, Philadelphia, Pa.

612,670 Electric cable switch; Addison Norman, Toronto, Can.

612,696 Rail joint for electric railways; Max Barschall, Berlin, Germany.—In an electric railway track, the combination with the rail joint of an auxiliary rail supported by the sleepers, and a conductor connecting both jointed track rails and placed in the space between the track rails and the auxiliary rail.

## TRADE NOTES.

**The New England Butt Company**, of Providence, R. I., has issued a well illustrated catalogue of their braiding and cabling machines and special machinery for electric wires and cables. This company was established over a half century ago—in 1842—and to-day its plant covers an area of upwards of two acres in the city of Providence. Among insulated electric wire manufacturers its product is widely and most favorably known. These companies will all be interested in the new catalogue.

**The Mica Insulator Company**, of New York, Chicago and London, manufacturers of "Micanite" materials for high-grade insulation, report a gratifying demand for their commutator rings. They make a specialty of manufacturing molded insulation, and are now turning out for some of the large manufacturers of electrical machinery molded rings all in one piece. This pattern of ring is the most difficult insulation to manufacture. But the ring as it comes from the machinery of this company is as perfect as a stamped piece of steel ware, and has the same metallic ring. Electrical manufacturers will do well to write the company, sending their blue prints for estimates. Another form of insulation of which they have made a specialty is the armature trough or slot, which is now in use by many of the manufacturers of motors for crane work and by those who require a heavy insulation which will stand at very high voltage. While this form of insulation is a trifle more expensive than the common red paper and "Mica," yet these concerns who manufacture machinery which receives such rough usage have found it necessary to get the best possible insulation for their armatures.


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| Insulating Tape, per roll, | 12c each |
| Spark Coils, 8 inches long, | 90c each |

and others just as cheap. Give me a memorandum of your contemplated order and get my prices before buying elsewhere. You will be surprised at my prices.

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**Counsellor in Patent Causes.**

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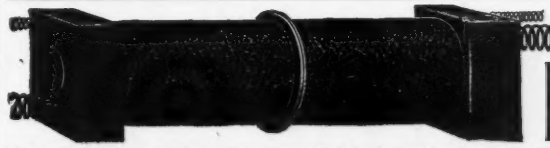

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# Kindred.... ...Interests

**The L. E. Knott Apparatus Company,** makers of X-ray, electrical and scientific apparatus, have moved from 14 to 16 Ashburton place, Boston.

**The Warren Electric and Specialty Company,** Warren, Ohio, has issued another of its attractive and convincing advertising blotters, telling about its high-grade, anti-trust incandescent lamps.

**The Berlin Iron Bridge Company,** of East Berlin, Ct., are erecting the extension of the foundry for the Benjamin Atha & Illingworth Company, at Harrison, N. J. This extension is 51 feet wide and 152 feet long. The framework is of steel throughout. The sides are covered with corrugated iron on steel purlins, and are arranged for suitable doors and windows The side columns support a 30-ton electric crane having a span of 46 feet. The roof construction is of steel trusses and purlins, arranged with openings in the roof for skylights.

**The name Packard** is a synonym for everything that is progressive in the electrical line. It has always been the policy of the Packard company to improve their material whenever opportunity offered. Their model '98 Packard transformer represents their latest improvement in the transformer line. They claim to have a transformer which is at the very top notch of transformer construction. They have a novel plan of guaranteeing just exactly what each transformer will do. All of their claims, guarantees, etc., are fully set forth in a special circular, which can be had from the Electric Appliance Company, Chicago, western agents for the Packard goods.

**The Jno. T. Noye Engine Company,** of Buffalo, N. Y., have, within a week, gone into the hands of a receiver. In an interview with Mr. A. A. Noye, of the company, a representative of the ELECTRICAL REVIEW learned that the move was necessitated by the inability of the company to get money after the execution of contracts, and not to a dullness of business. It is thought that the receivership will be temporary, probably for not more than a few months. The plant and factory of the Jno. T. Noye Engine Company is one of the largest and best in Buffalo. It is located near the center of the city, and covers nearly two ordinary city blocks. The company is one of the oldest in the mechanical lines, and, aside from the making of the Rice engines, it has always done a large business in the production of special machinery for flour mills.

**In a recent letter** to the Westinghouse Electric and Manufacturing Company, Mr. R. G. Vance, Jr., superintendent of the Stevens Coal Company, makes the following statements regarding the Baldwin-Westinghouse electric mine locomotive in operation in their mines: "It gives us pleasure to say that this motor is giving the very highest possible satisfaction, and is attracting considerable attention in this valley. It has been running since May 1, and has not cost a dollar in the shape of repairs, excepting a new valve for sand-box and a headlight base, broken in a collision with a car. It is running on a road of 25 lb. steel 4,000 feet long over undulating grades varying from one to six feet per 100 feet. Its regular load now consists of 20 cars of one and one half tons capacity, and the time required for each round trip is from 17 to 19 minutes. We have pulled as high as 25 of these cars at one trip, which it did with all ease. When necessity requires we can pull 30 cars, giving 50 per cent more capacity than you guaranteed." This is evidence of the superior qualities of this mining locomotive, which is characteristic of the work done by the Baldwin and Westinghouse companies.


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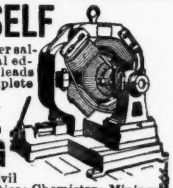
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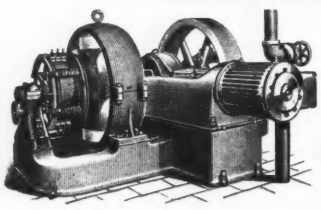
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